AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING
ENGINEERING • PRODUCTION • MANAGEMENT

NOVEMBER 1, 1958

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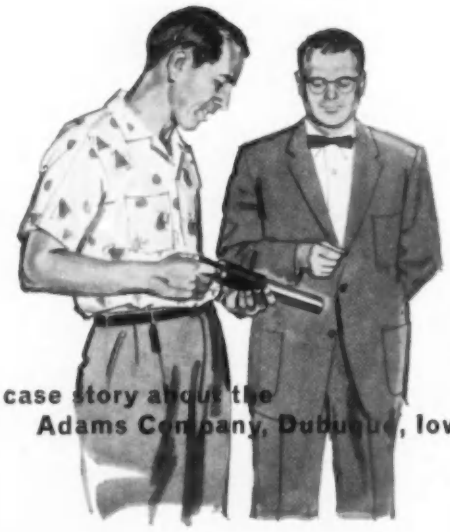
A CHILTON PUBLICATION

Bob showed them a new product that ended rust on work and tools—

STANDARD Special Transparent Coolant



A case story about the Adams Company, Dubuque, Iowa

Before Standard Oil lubrication specialist Bob Wenger told The Adams Company management about Standard's SPECIAL TRANSPARENT COOLANT, there had been considerable trouble with rusting of work and machines in the plant. There had also been trouble with deposits on the ways of the grinding machines. Rust occurring on parts being processed was resulting in damage and even losses. This has been changed.

"Since we changed to your SPECIAL TRANSPARENT COOLANT, we have not had any rusting or deposits on our machine tools, and this product has eliminated the rusting problem on parts being processed through our plant," says Harlow Adams, president of the company.

The Adams Company found they received important additional benefits as well. Operators could now see their work clearly. There was less wheel loading. Because the coolant didn't foam, more of it stayed on the wheel resulting in cooler operation. Faster cuts were obtained with finer wheels. Finer wheels gave better finishes. Periods between dressings were extended. Tolerances were maintained.

Research, development and more than two years of field testing have gone into Standard's SPECIAL TRANSPARENT COOLANT. This is the pay-out to you on the research done by Standard Oil to bring you better metalworking products. Find out more about Standard's SPECIAL TRANSPARENT COOLANT. Call your nearby Standard Oil lubrication specialist in any of the 15 Midwest or Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

Quick facts about
Special Transparent Coolant

- Clear, transparent fluid.
- Able to control corrosion and rust on work and machines.
- All chemical. Does not support bacteria growth.
- Unaffected by humidity.
- Nonfoaming.
- Fire resistant.
- Odorless.

No rust. Shaft ground with Standard's SPECIAL TRANSPARENT COOLANT shows no rust on inspection by A.T. Murphy, General Superintendent, Harlow Adams, President, and Bob Wenger, Standard Oil lubrication specialist.

You expect more from STANDARD *and get it!*

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WORK-BOAT WORKS MORE WITH NEW POWER!

Salmon boat repowered by Hoffars Limited, Vancouver, B. C. . . . with Cotta HA transmission

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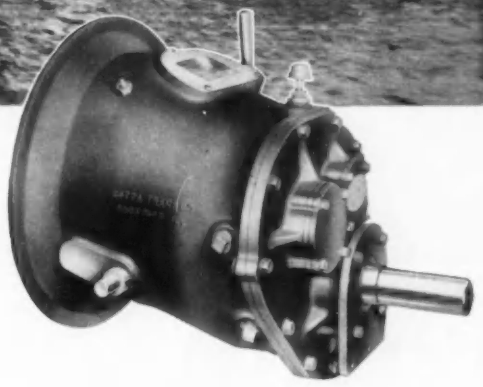

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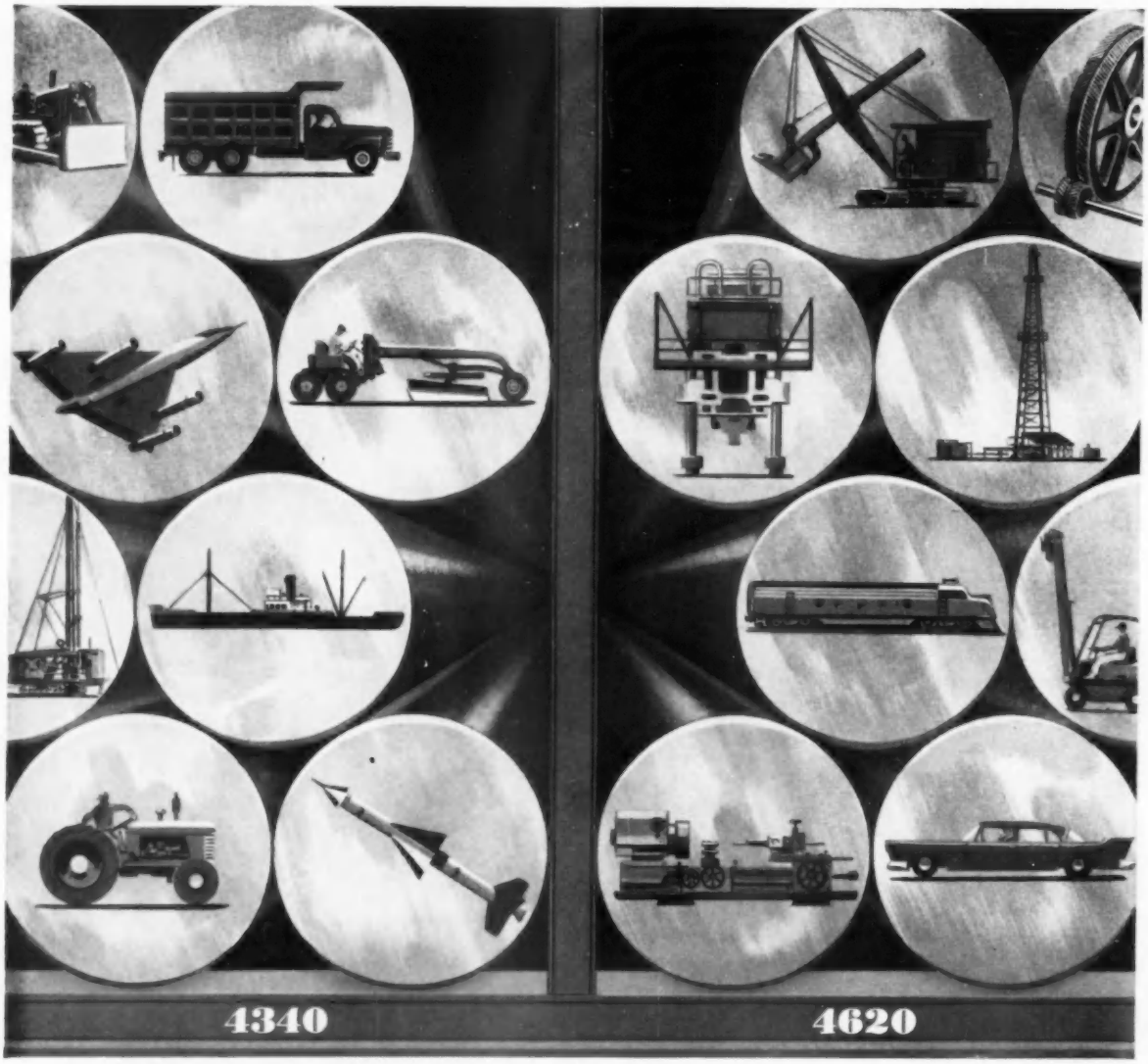

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AUTOMOTIVE INDUSTRIES

A CHILTON MAGAZINE — PUBLISHED SEMI-MONTHLY

NOVEMBER 1, 1958 — VOL. 119, NO. 9

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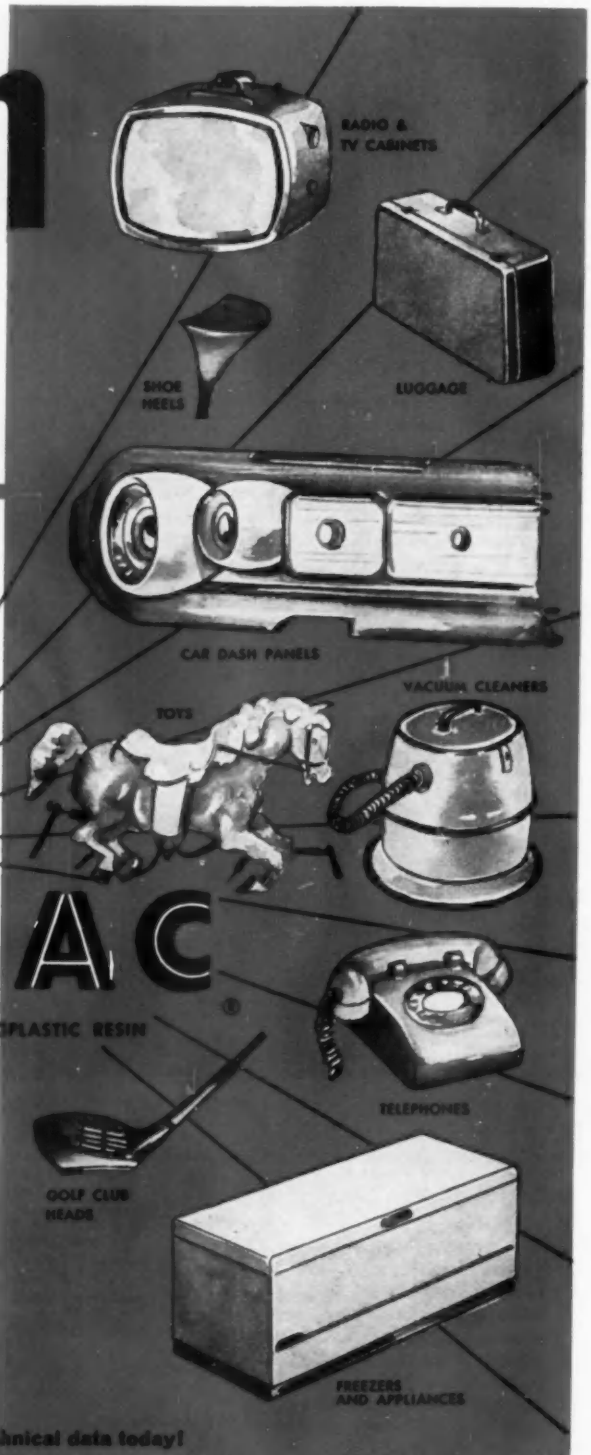

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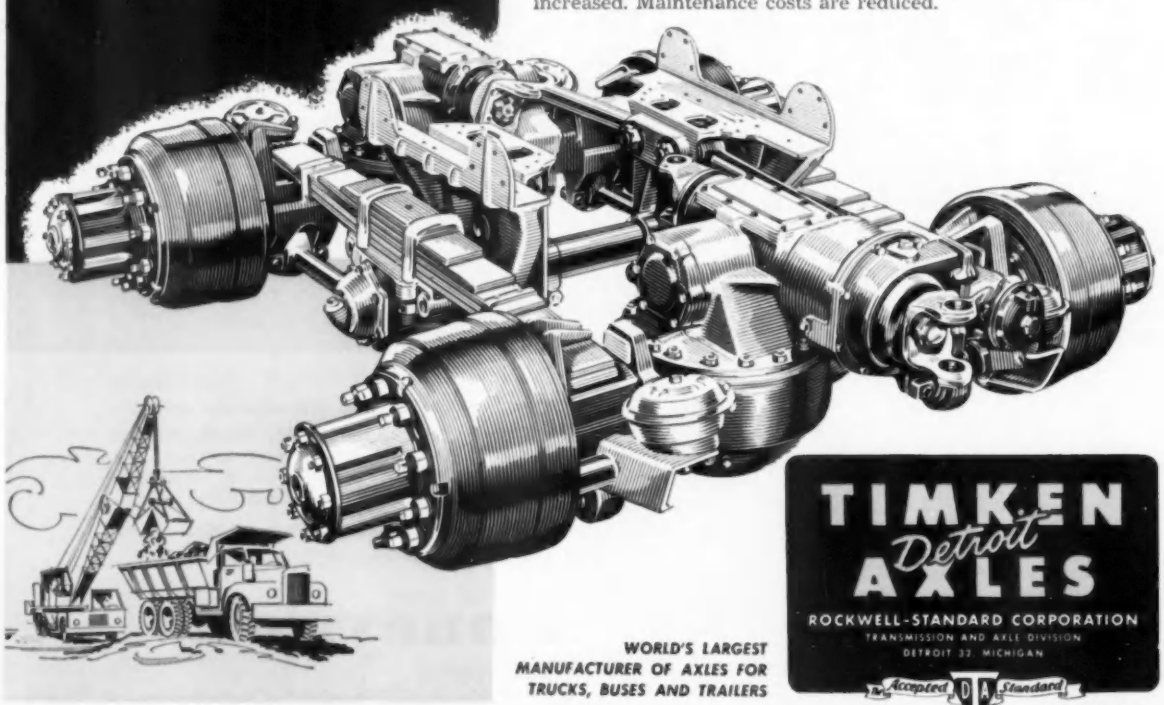

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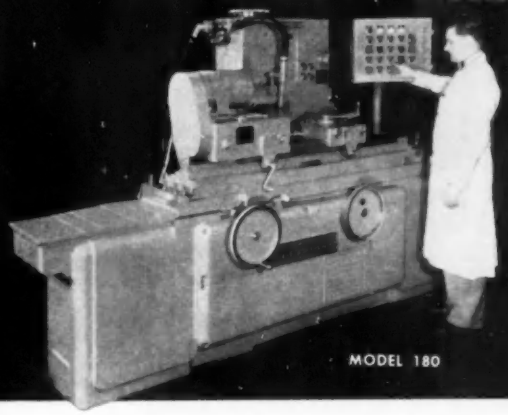
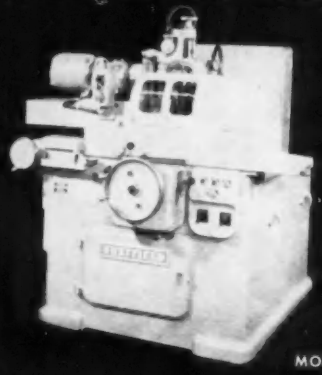
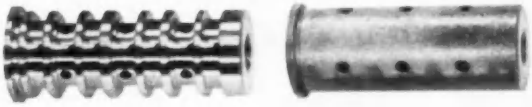


MODEL 180



MODEL 109



Servo Mechanism Sleeve

The seven grooves of this servo mechanism sleeve are crushtrue ground from the solid to a tolerance of .001" on spacing and .002" on minor diameter in 55 seconds. Material, SAE 52-100; Rockwell, 58-60 C; depth of plunge grind, .145".

Forms and grooves are precision ground on these machines with comparable speed and economy.

For complete details write to Department 4, The Sheffield Corporation, Dayton 1, Ohio, U.S.A.

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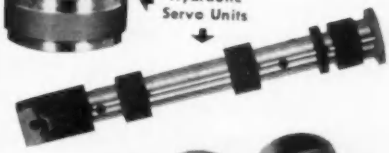
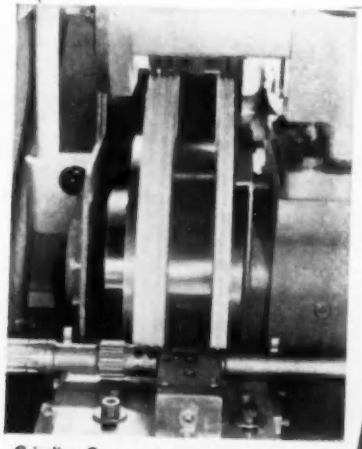
Hydraulic Servo Units



Self-aligning Bearings



Grinding Grooves in a Transmission Shaft

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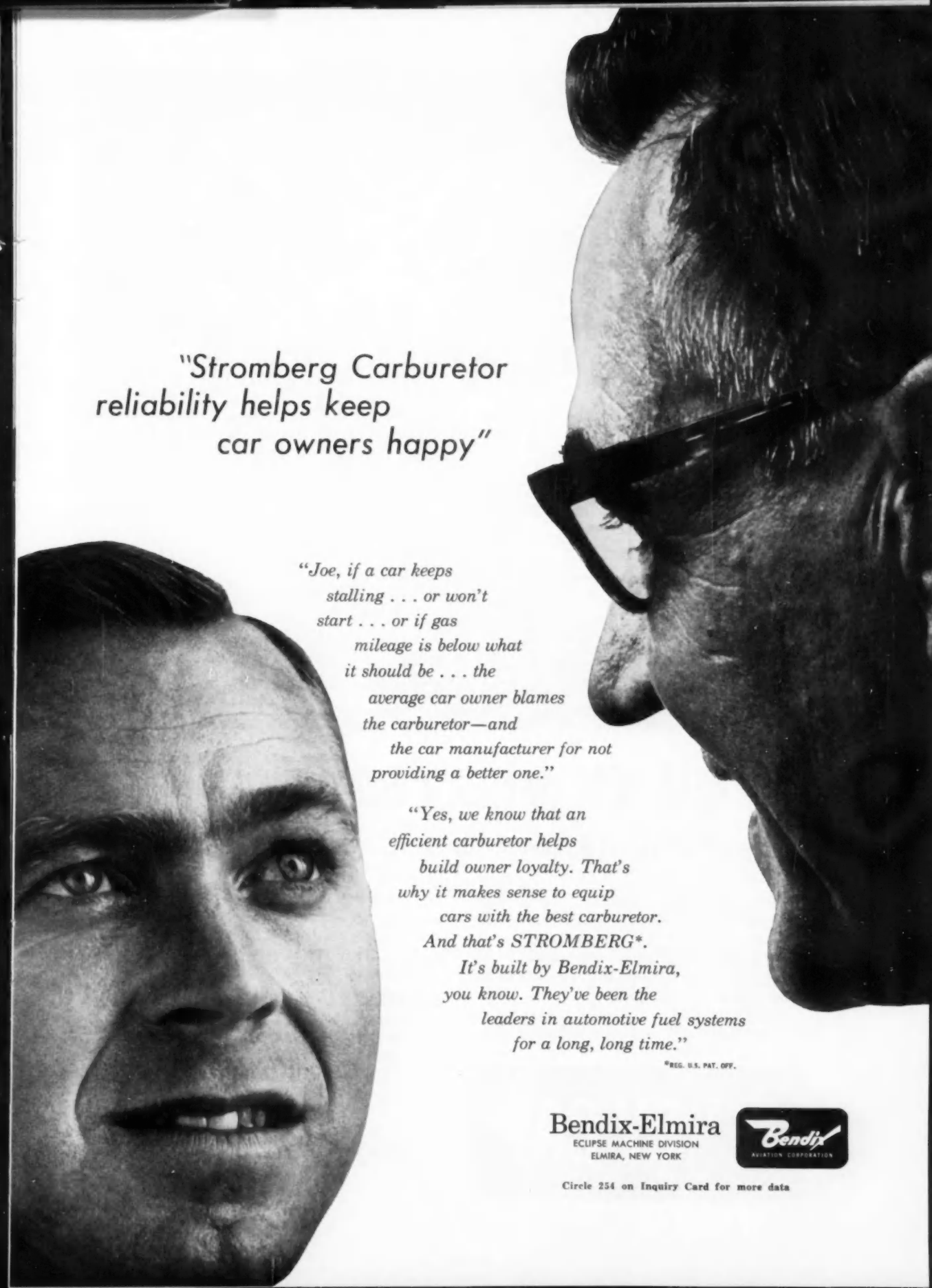

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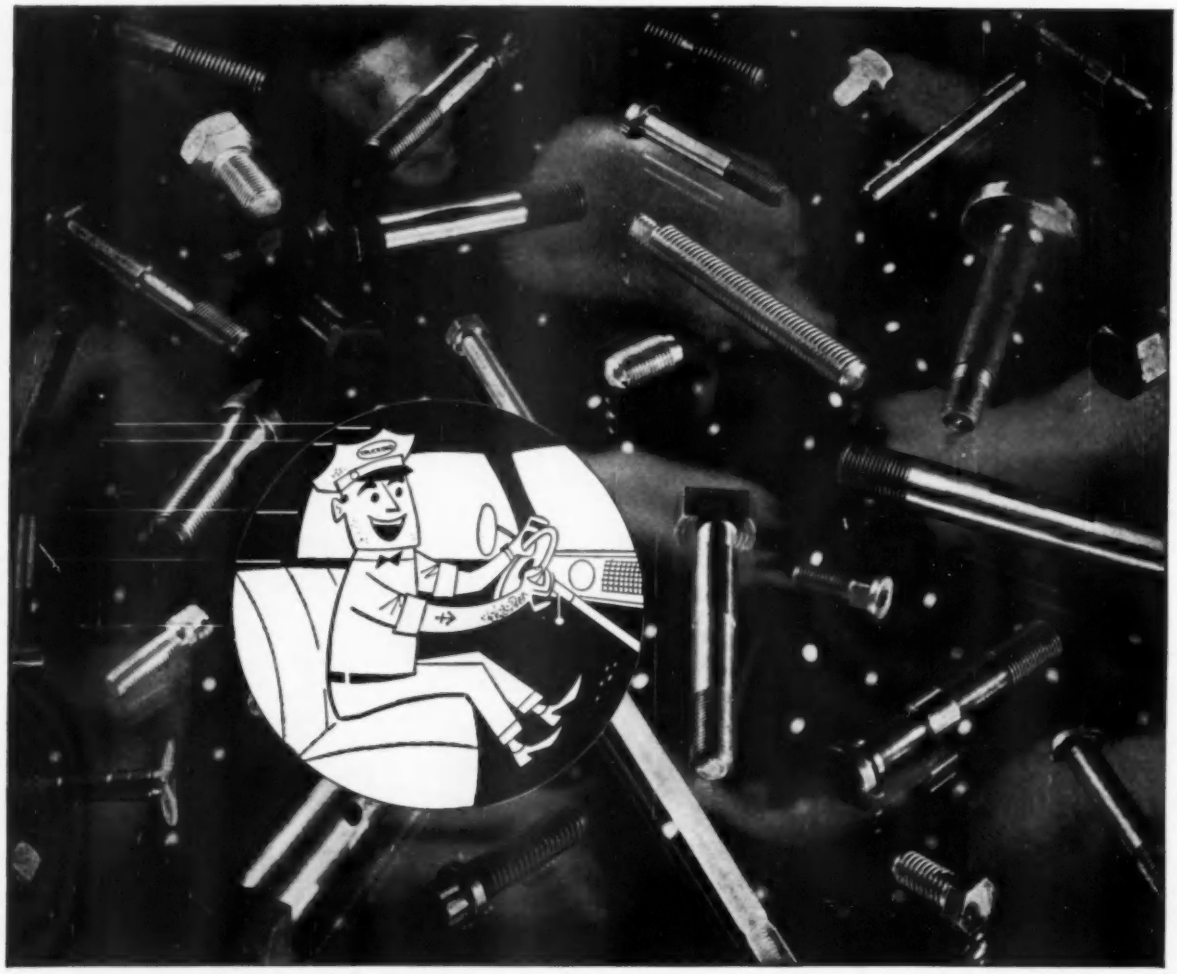

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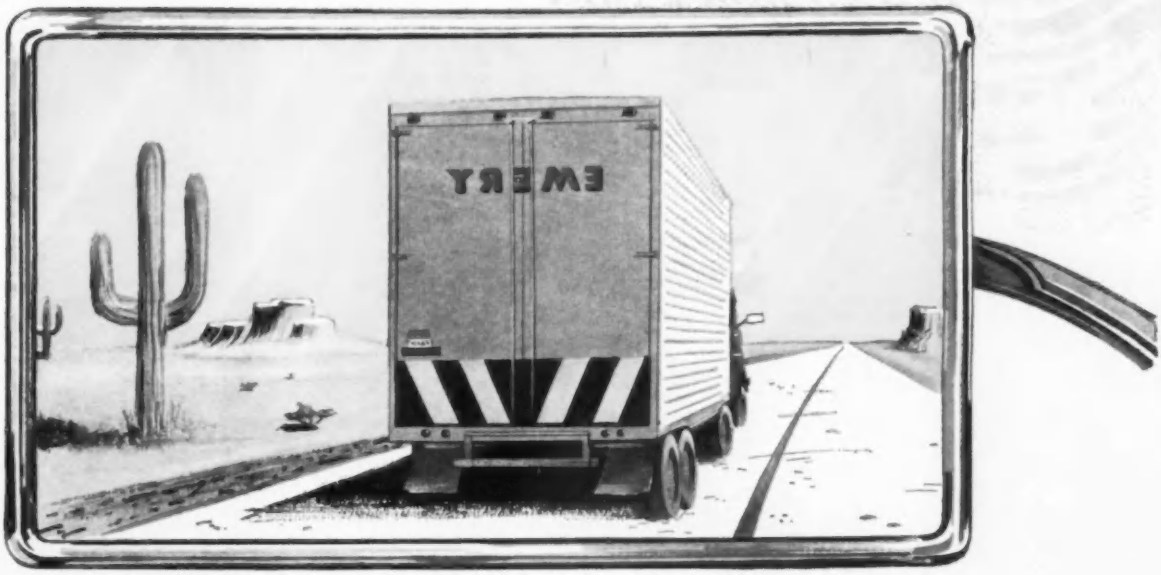
RIGID URETHANE FOAM INSULATION passes rugged "road test"!



In use under actual road conditions, rigid urethane foam insulation is rated excellent for all-around performance in refrigerated truck trailers!

It is currently proving its superiority as well in "reefer" cars, home appliances, and industrial, commercial and other refrigeration equipment.

Besides combining insulating efficiency with many practical plus values, urethane frequently costs less installed. Molded, sprayed or foamed in place or worked from slab stock, urethane foam saves production time and labor. Since it adds rigidity, lighter structural materials can be substituted in many applications

If you want to explore the use of urethane foam insulation, our application laboratory can give you valuable assistance. We produce NACCONATE® Diisocyanates, essential components in all urethane formulations.

Modular "sandwich" panels of rigid urethane foam, provide complete isolation for truck trailers, eliminating heat loss due to through-metal contacts.

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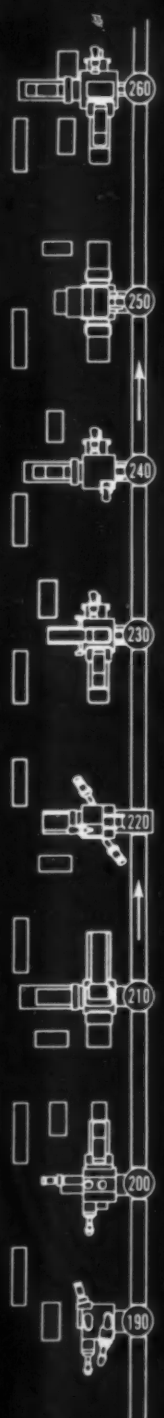
Automation for Low Volume Production



Operation 260—Four-Way Machine—reams dipstick hole; finish reams valve lifter holes; reams 7 holes in rear end; taps 1 hole in top.

Operation 250—Four-Way Machine—taps 6 holes in rear, 22 holes in front, 10 holes in each bank, and 6 holes in top.

Operation 240—Three-Way Machine—drills dipstick hole; drills angular hole in top; reams dowel holes in front end; drills 2 holes in front end.

Operation 230—Three-Way Machine—reams dowel holes in banks; drills and chamfers 3 holes in top; end mills dipstick hole.

Operation 220—Four-Way Machine—taps left side; taps left underbank; drills miscellaneous angular oil holes.

Operation 210—Four-Way Machine—taps right side, right underbank, pan holes, bearing cap bolt holes, and 9 holes in front end.

Operation 200—Five-Way Machine—reams 6 holes in underbanks; reams 1 hole in front end; drills 2 angular oil holes; taps 1 angular hole in pan face.

Operation 190—Five-Way Machine—drills 5 angular oil holes in pan face, sides and front.

Operation 110—Five-Way Machine—drills 8 water holes in banks; rough bores and spotfaces distributor and breather holes; drills oil gallery.

Operation 120—Five-Way Machine—drills and chamfers cylinder head stud holes; semi-finish bores distributor and breather holes; rough bores Nos. 1, 2, 4 and 5 cam bearings.

Operation 130—Five-Way Machine—drills and rough reams valve lifter holes; spotfaces and reams distributor and breather holes; drills 2 oil feeder holes from banks to cam bore; reams oil gallery.

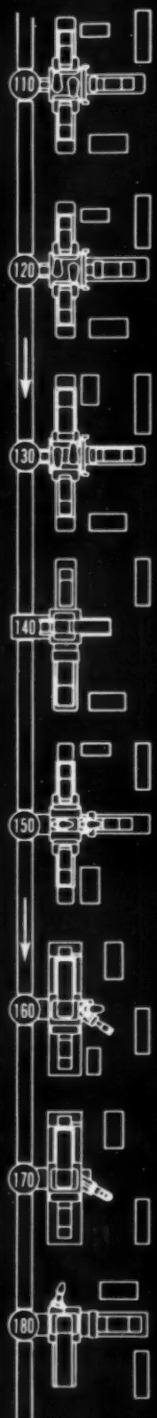
Operation 140—Two-Way Machine—rough bores No. 3 cam bearing; drills and chamfers 22 holes in front end and 5 holes in top.

Operation 150—Five-Way Machine—drills and chamfers 11 holes in underbanks and 12 holes in front end; drills 2 angular oil holes.

Operation 160—Five-Way Machine—drills and chamfers 6 holes in sides; drills 21 pan holes; drills and counterbores angular hole in rear end; drills 3 oil holes crank to cam.

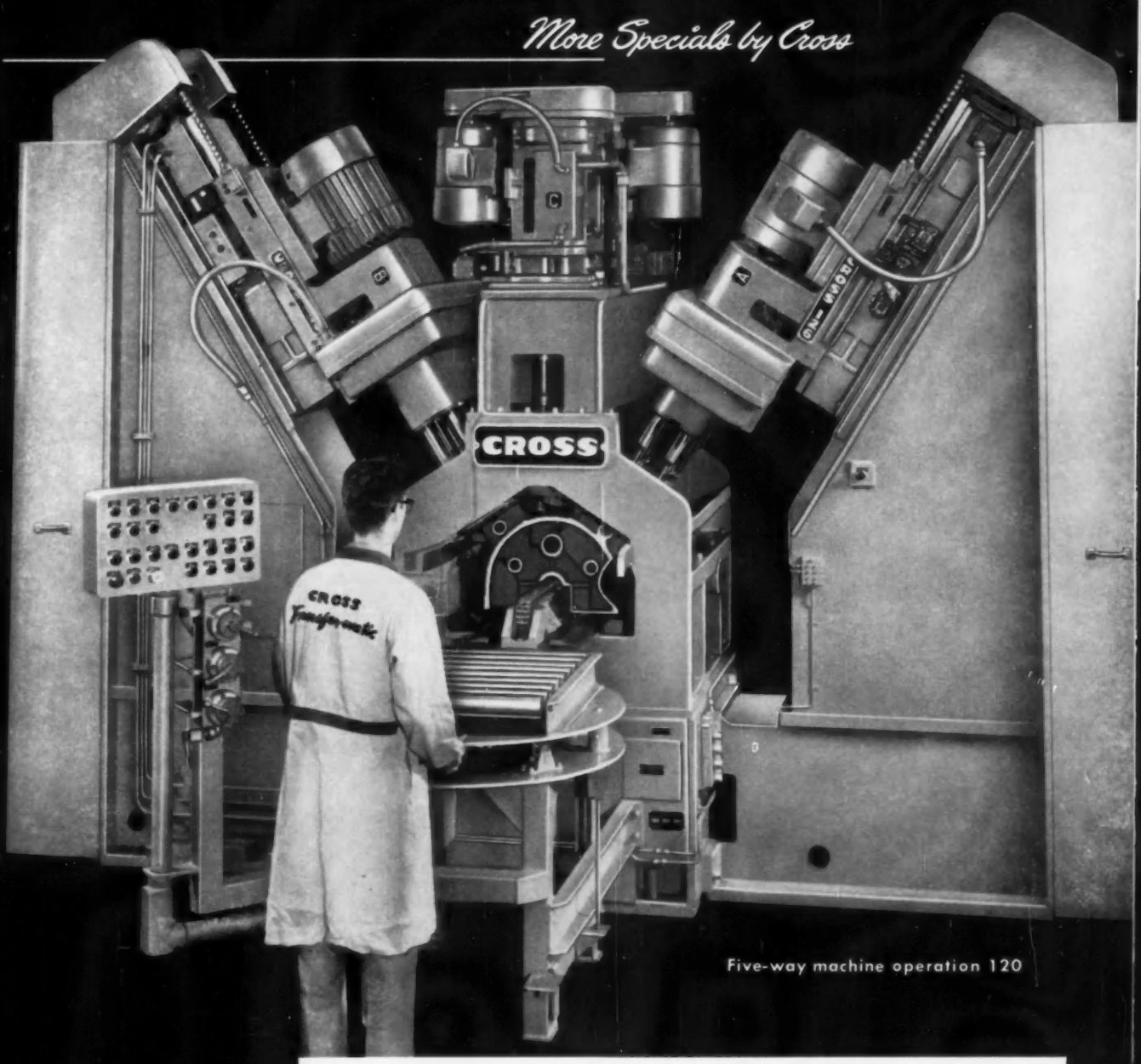
Operation 170—Four-Way Machine—drills and chamfers 10 holes in sides; drills bearing cap bolt holes; end mills start for angular hole in front.

Operation 180—Three-Way Machine—drills and chamfers 13 holes in rear end; chamfers 20 pan holes; counterbores bearing cap bolt holes; counterbores angular hole in left side.

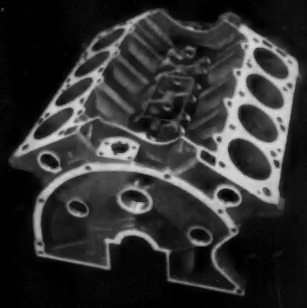


Floor plan of 16 single station machines for processing cylinder blocks

More Specials by Cross



Five-way machine operation 120



Here is a new kind of manufacturing line—one that utilizes automation for low volume production. It machines truck engine blocks at the rate of 15 per hour.

The unique material handling arrangement for the line permits one operator to take care of several of the 16 machines. To load any machine, the operator merely places the part on the turntable, rotates it 90 degrees, moves it about six inches toward the machine and pushes the cycle button. The machine then takes hold of the part, draws it into the work holding fixture, locates and clamps it, performs the machining operation and ejects it back onto the turntable—all automatically.

Other features include: complete interchangeability of all standard and special parts, construction to JIC Standards, hardened and ground ways, hydraulic feed and rapid traverse, and automatic lubrication.

Established 1898

THE CROSS CO.

First in Automation

PARK GROVE STATION • DETROIT 5, MICHIGAN

XXX

This is the thirtieth of a series of advertisements dealing with basic facts about alloy steels. Though much of the information is elementary, we believe it will be of interest to many in this field, including men of broad experience who may find it useful to review fundamentals from time to time.

Evaluating the Machinability of Alloy and Carbon Steels

To produce a useful part, most steel has to be shaped by one or more of the metal forming methods. One of these is metal cutting or machining, which changes the shape, size, or finish of a workpiece.

Alloy or carbon steels are often received from the mill in the raw form of bars, forgings, or castings. The steel is placed in a suitable machine, such as a lathe, multiple-spindle automatic bar machine, drill press, milling machine, or one of a number of other types. Metal is then removed from the steel stock until it has acquired the desired shape. This is accomplished by causing motion to take place in the sharp-edged cutting tool, or the piece of steel, while they are held in contact with each other. Cutting tools, such as drills, tool bits, milling cutters, and the like, are made from highly-alloyed steel (tool steel), cast alloys, sintered carbide, or even ceramic material.

During machining, the metal is removed in the form of chips which may be of any length, from the short, well-broken type, to the long, stringy and continuous variety—depending upon the nature of the steel, the shape or geometry of the cutting tool, the speed and feed at which the cutting is done, and the coolant or cutting fluid applied.

"Machinability" of steel refers primarily to the ease with which it can be reduced to its final shape. It is measured by the speed and feed at which it can be cut, the quality of the surface finish produced, the length of time the tools will last, and the kind of chip formed in cutting. In a "free-machining" grade of steel, for example, high speeds and feeds can be used, tools will stand up well, surface finish will be good, and chips well broken.

Machinability is evaluated in the shop by the number of pieces having a satisfactory finish, within the required dimensional tolerances, that can be produced in a shift, or a day, with adequate tool life.

It can be appreciated that the study of the cutting of metals involves a large number of variables. These may be grouped in the following way:

1. Steel Analysis (Process, composition, microstructure, and mechanical properties)
2. Machine Tool (Condition, tool accessories, range of cutting speeds and feeds with ample power, etc.)
3. Type of Machining Process (Turning, milling, forming, broaching, etc.)
4. Cutting Condition (Speeds, feeds, and depth of cut)
5. Cutting Tool (Composition, treatment, hardness, size, shape, grinding and surface finish)
6. Cutting Fluid (Characteristics, application, and volume)

From this number of complex factors, laboratory tests and investigations have developed experimental data by using single variables, such as steel analysis, tool analysis, tool shapes, and cutting fluids. This information has proved to be a useful guide when combined with industrial experience; for no test method by itself has yet been developed that will include all the characteristics of a specific single or multiple-machining operation.

Bethlehem metallurgical engineers have had long and varied experience and knowledge on the machinability of alloy and carbon steels. They will gladly give you any help you may require in connection with machining problems.

In addition to manufacturing all AISI standard alloy steels, Bethlehem produces other than standard analysis steels, and the full range of carbon grades. Call your nearest Bethlehem sales office for information.

If you would like reprints of this series of advertisements, please write to us, addressing your request to Publications Department, Bethlehem Steel Company, Bethlehem, Pa. The subjects in this series are now available in a handy 44-page booklet, and we shall be glad to send you a free copy.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

Circle 258 on Inquiry Card for more data

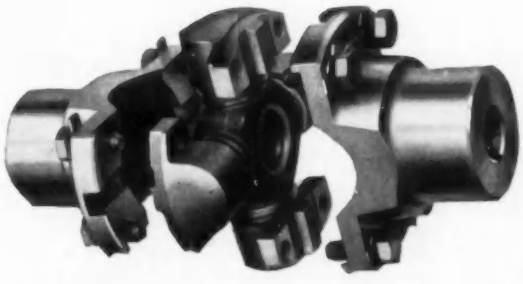
Fifteen Minute Servicing

On the Road or In the Field

Unique features of MECHANICS Roller Bearing UNIVERSAL JOINTS make them unusually easy to install and service. The complete cross and bearing assembly can be removed simply by taking out the cap screws and separating the yoke ends slightly. No flange is required for drive connections. Accurately and durably built for long, heavy service, MECHANICS Roller Bearing UNIVERSAL JOINTS are inherently balanced for smooth operation.

Let our engineers show you how MECHANICS close-coupled Roller Bearing UNIVERSAL JOINTS conserve space and compensate for offset shafts, in your new and improved models.

MECHANICS UNIVERSAL JOINT DIVISION
Borg-Warner • 2024 Harrison Ave., Rockford, Ill.
Export Sales: Borg-Warner International
36 So. Wabash, Chicago 3, Illinois

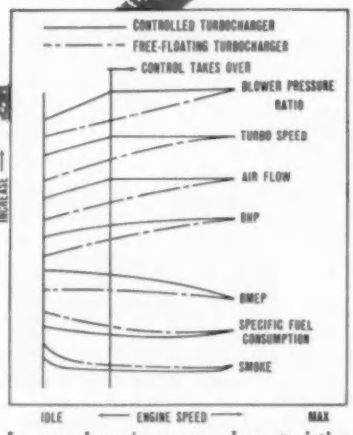


MECHANICS
Roller Bearing BW
UNIVERSAL JOINTS
For Cars • Trucks • Tractors • Farm Implements • Road Machinery • Aircraft • Tanks • Busses and Industrial Equipment

Circle 259 on Inquiry Card for more data

NOW!
CONTINUOUS, FULL POWER TURBOCHARGING

AiResearch control system keeps turbocharger output at ideal level



Improved performance characteristics of a typical turbocharged diesel engine equipped with the new AiResearch Turbocharger Control System.

Accurate control of turbocharger speed over its complete range regardless of changing load characteristics has been achieved with the new AiResearch Turbocharger Control System. This automatic control system delivers more air to the engine when needed and greatly increases torque rise, giving turbocharged diesel engines greater lugging ability when operating under heavy loads. By contrast, free-floating turbochargers operate at reduced RPM when the engine is working at below-maximum engine speed.

This improved air delivery system greatly increases the acceleration, for example, of turbocharged diesel trucks up steep grades. In a typical case, the round-trip time of a trucking company operating between Phoenix and Denver was cut from 48 hours to 42 hours. Over short hauls an off-the-road truck cut its 27-minute round-trip time to 18 minutes. Comparable gains are made for all types of turbocharged diesel equipment, stationary or mobile.

The two components of the new control system are a pressure ratio sensor and an exhaust by-pass valve. They control the speed of exhaust-driven turbochargers by modulating the amount of engine exhaust used. This eliminates overspeeding of the turboblower, and at the same time provides higher turboblower speed while lugging. Smoking is virtually eliminated under all conditions.

Your inquiries are invited.

THE GARRETT CORPORATION

AiResearch Industrial Division

9225 South Aviation Blvd., Los Angeles 45, California

DESIGNERS AND MANUFACTURERS OF TURBOCHARGERS AND SPECIALIZED INDUSTRIAL PRODUCTS

Circle 260 on Inquiry Card for more data

Roebling Tire Bead Wire: Packaged for Maximum Benefit

The problems eliminated by this unique reel-less core packaging system are manifold. Loads are palletized two cores per pallet and may be stacked two or three high. This, plus the fact that you need not accumulate empty reels means storage space requirements are cut to *less than half*. You do away with all freight and handling costs on reels, the bother and expense of "bookkeeping" returnable reels, and the freezing of money in reel deposits.

This is typical of Roebling's advanced packaging methods—that makes handling Roebling high-quality wire so much easier. For details on this efficient Roebling Tire Bead Wire packaging method, or information on other types of Roebling wire, write Wire and Cold Rolled Steel Products Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

ROEBLING

Branch Offices in Principal Cities

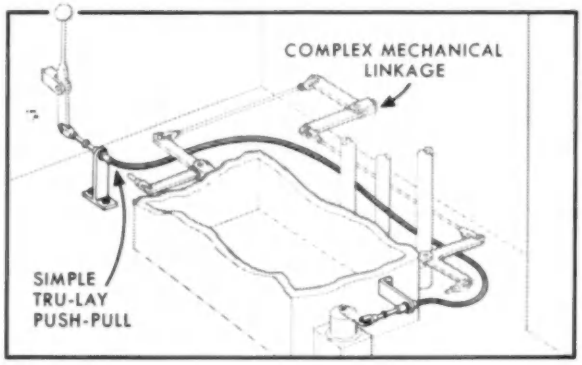
Subsidiary of The Colorado Fuel and Iron Corporation

(Advertisement)

with TRU-LAY PUSH-PULL controls, you can---

MAKE HUNDREDS OF PRODUCTS MORE USEFUL, EASIER TO SELL

Tru-Lay Push-Pull controls provide positive remote action over long or short distances. Because they operate while flexing, they can snake around obstructions. They are ruggedly constructed, easily installed and operated, and are sealed against dirt and moisture. Push-Pulls are simple, have but one moving part, are noiseless, and give a lifetime of accuracy. Linkages, on the other hand, are complex. They're made of many parts, wear at many points, and produce increased backlash, lost accuracy, and vibration rattles.



Here's Why Push-Pull Controls Simplify Design, Give Better Performance

Long Life—We have never heard of a Tru-Lay Push-Pull wearing out in normal service.

Dependable Operation—Top performance under the most adverse conditions...in temperatures ranging from −70°F to the high levels of jet engine operation...in wet locations...in abrasive atmospheres.

Freedom from Trouble—Inner working member is fully protected by tough, flexible conduit...lifetime factory lubrication...sealed against entrance of dirt, moisture, and other foreign matter...cold swaging of all fittings.

Accuracy—Built to the most exact standards of quality and precision. On automobile pushbutton transmissions, for instance, Push-Pull controls provide five positions with a total movement of only .560".

Capacity—Push-Pull controls will handle jobs with as much as 1,000 lbs. input, 150 feet or more from the control point.

Adaptability—Push-Pull controls can be adapted to countless applications. Standard anchorages, fittings, and heads meet almost any requirement, and modifications can be made to fit special situations.

Design Engineers Report on Benefits

Saves Time, Labor, and Material
"We use Push-Pulls to operate clutch controls on the main power unit, feed conveyors, and delivery conveyors...and we save the time, labor, and material required for planning and engineering the old linkages."

Greater Flexibility of Design
"Push-Pulls give us flexibility in locating the hydraulic control valve in relation to the operator's position."

Cost Less to Install
"They are easier and less expensive to install than linkages for remote control of power take-off."

Solution to Tough Problem
"Can be installed where straight rods are impossible."

Eliminates Maintenance
"No maintenance whatsoever; not even lubrication is required."

Reduces Number of Parts
"Your Push-Pulls have eliminated links, radius rods, and other lost-motion devices for remote control of hydraulic valves."

Provide Accurate Control
"We get minimum backlash because the cable is designed to close tolerances with minimum drag and lost motion."

Push-Pulls Can Help Solve YOUR Remote Control Problems

Push-Pull controls are solid as a rod and flexible as a wire rope. You can use them in the electrical, hydraulic, and pneumatic systems on construction equipment, on farm implements...almost *anywhere* convenient remote control is desired. For complete details on how you can use them, write for a copy of the Push-Pull Data File. It contains 7 bulletins which describe in detail the operation of Push-Pulls, their applications, features, and advantages. Our engineers will be glad to help you make Tru-Lay Push-Pull controls a part of your product.

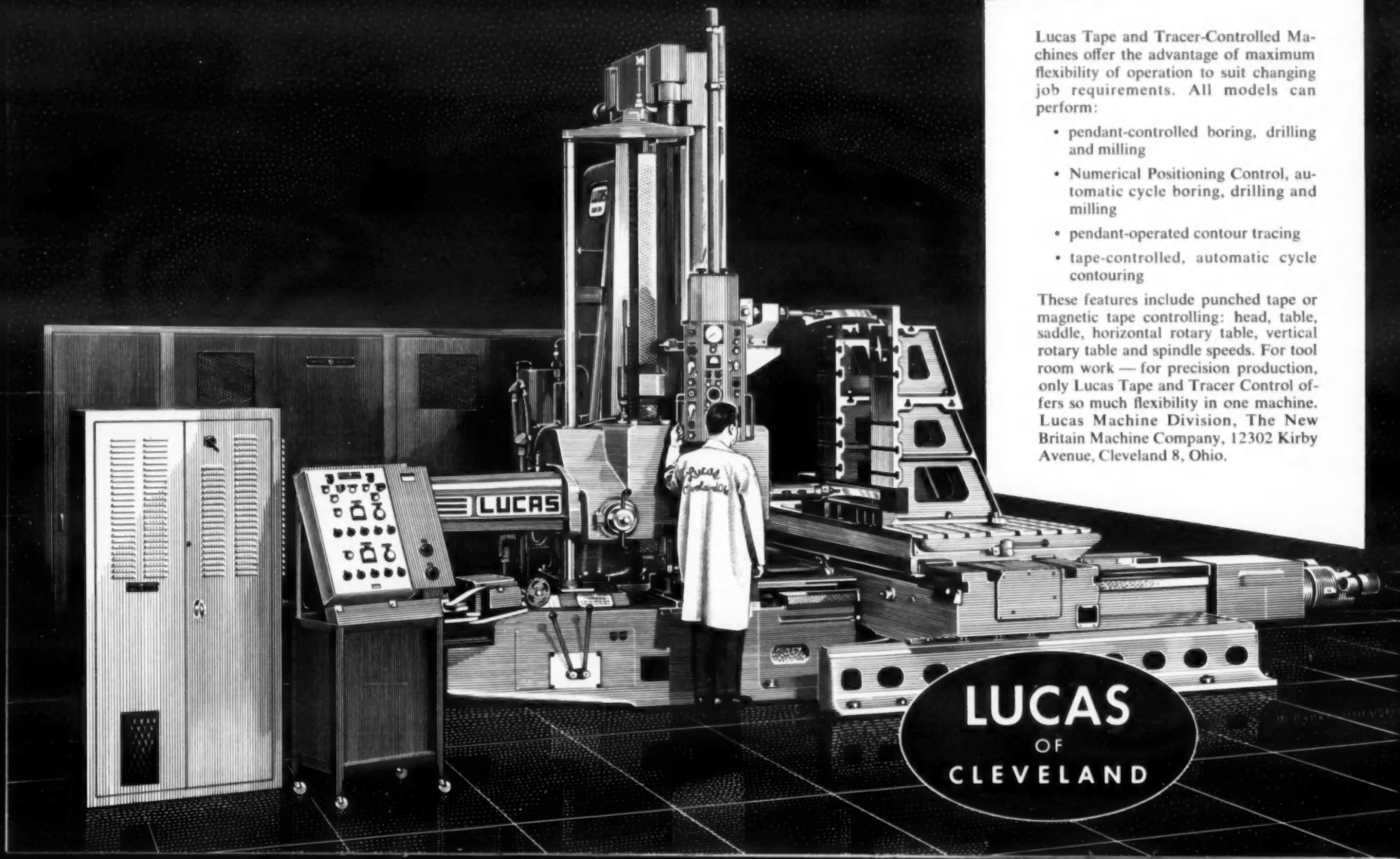
Automotive and Aircraft Division
AMERICAN CHAIN & CABLE

ACCO
TRADE MARK

601-H Stephenson Bldg., Detroit 2
2216-H South Garfield Ave., Los Angeles 22 • 929-H Connecticut Ave., Bridgeport 2, Conn.

A New Lucas Lathe
Fully-automatic Tape Control, Tracer Control or both. Infinitely variable speeds and feeds. Automatically-maintained, constant-cutting speeds on changing diameters. Console control from moving operator's platform. *Three* hardened and ground ways. Self-contained Motor Generator Set.
The Lucas Lathe — perfect for your large, lightweight, close tolerance, intricately-shaped problem jobs. Lucas Machine Division, The New Britain Machine Company, 12302 Kirby Avenue, Cleveland 8, Ohio.
LUCAS
OF
CLEVELAND

Lucas Tape and Tracer Control



Lucas Tape and Tracer-Controlled Machines offer the advantage of maximum flexibility of operation to suit changing job requirements. All models can perform:

- pendant-controlled boring, drilling and milling
- Numerical Positioning Control, automatic cycle boring, drilling and milling
- pendant-operated contour tracing
- tape-controlled, automatic cycle contouring

These features include punched tape or magnetic tape controlling: head, table, saddle, horizontal rotary table, vertical rotary table and spindle speeds. For tool room work — for precision production, only Lucas Tape and Tracer Control offers so much flexibility in one machine. Lucas Machine Division, The New Britain Machine Company, 12302 Kirby Avenue, Cleveland 8, Ohio.

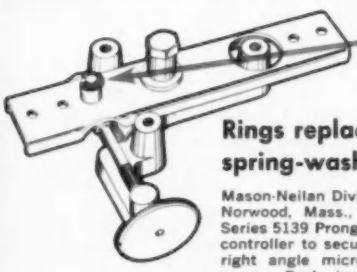
Waldes Truarc Prong-Lock Ring Eliminates Springs, Washers, Takes Up End-Play

WALDES TRUARC
SERIES 5139 RETAINING RING*

application: external for shafts
range: 3/32" through 7/16"

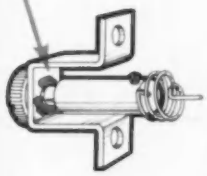
*U. S. Pat. No. 2,755,698

After radial application, the Waldes Truarc Prong-Lock retaining ring locks and holds securely in its groove by means of two prongs. Because of its resistance to radial displacement, the ring may be used as a shoulder for rotating parts. Thrust-load capacity ranges from 80 to 700 lbs. for sizes from 3/32" to 7/16". Bowed construction provides end-play take-up, often eliminating springs, washers and accessory devices.



Rings replace cotter pins, spring-washers; save $68.00/M

Mason-Neilan Division of Worthington Corp., Norwood, Mass., uses two Waldes Truarc Series 5139 Prong-Lock rings on its pressure controller to secure pivots through which a right angle micrometer adjustment screw passes. Each ring replaces hairpin-type cotter pin and bowed washer.. provides necessary tension to prevent adjustment screw from shifting. Manufacturing costs were reduced by $68 per 1,000 units.



Ring replaces locknut, eases control calibration

On a differential pressure control mechanism, Taylor Instrument Companies, Rochester, N. Y., replaced a locknut and eliminated a costly threading operation with a series 5139 Prong-Lock ring. Also eliminated is the loosening and tightening of the locknut before and after each calibration setting. Spring action of the ring securely holds the calibration setting.

Whatever you make, there's a Waldes Truarc Ring designed to save you material, machining and labor costs, and to improve the functioning of your product.

In Truarc, you get:

Statistically Controlled Quality from engineering and raw materials to the finished product. Every step in manufacture watched and checked in Waldes' own modern plant.

Complete Selection: 36 functionally different types. As many as 97 standard sizes within a ring type. 5 metal specifications and 14 different finishes. All types available quickly from leading OEM distributors in 90 stocking points throughout the U. S. and Canada.

Field Engineering Service: More than 30 engineering-minded factory representatives and 700 field men are at your call.

Design and Engineering Service not only helps you select the proper type of ring for your purpose, but also helps you use it most efficiently. Send us your blueprints today . . . let our Truarc engineers help you solve design, assembly and production problems . . . without obligation.

B 1

WALDES
TRUARC®
RETAINING RINGS

WALDES KOHINOOR, INC., LONG ISLAND CITY 1, N. Y.

Waldes Kohinoor, Inc., Long Island City 1, N. Y.

Please send me additional information and engineering data for the Truarc Prong-Lock Ring, Series 5139.

Name_____

Title_____

Company_____

Business Address_____

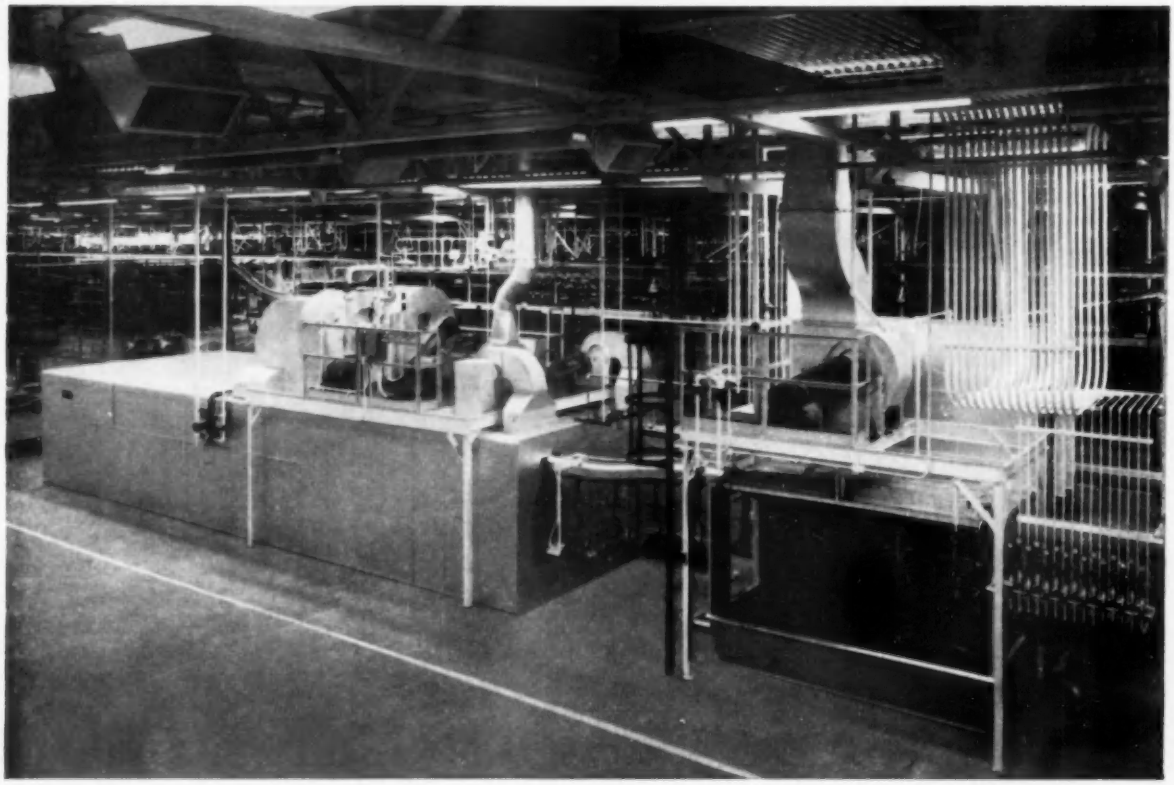
City_____ Zone____ State_____

AY-110

Consult the Yellow Pages of your Telephone Directory for name of Local Truarc Factory Representative and Authorized Distributor. Look under "Retaining Rings" or "Rings, Retaining."

©1958 Waldes Kohinoor, Inc.

FINISHING SYSTEMS...



for Miscellaneous Parts in Various Colors!

The Spray Booth and Finish Baking Oven illustrated above handle the Finishing Operations on a group of small parts . . . this equipment is part of a large Mahon installation that provides cleaning, rust proofing, painting and finish baking facilities for all items produced in a large automobile parts plant.

If you have a finishing problem, or are contemplating new finishing equipment, you, too, will want to discuss methods, equipment requirements and possible production layouts with Mahon engineers . . . you'll find them better qualified to advise you, and better qualified to do the initial planning and engineering which is so important in the specially designed equipment of a modern, properly coordinated production finishing system.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

SALES-ENGINEERING OFFICES in DETROIT, NEW YORK and CHICAGO

Engineers and Manufacturers of Complete Conveyorized Finishing Systems; Metal Parts Washers, Metal Cleaning and Rust Proofing Machines, Conveyorized Cleaning and Pickling Machines; Dry-Off Ovens, Cooling Tunnels, Spray Booths, Electrostatic Spray Enclosures, Flow Coaters, Dip Coaters, Finish Baking Ovens, and Paint Stripping Equipment; Core Ovens, Soldering Ovens, Heat Treating and Quenching Equipment for Aluminum and Magnesium; Dust and Fume Control Installations, and Many Other Units of Special Plant and Production Processing Equipment.

See Sweet's Plant Engineering File for Information and Representative Installations, or Write for Catalogue A-659

. . . the **EXPERIENCE** that goes into the **PLANNING** and **ENGINEERING** of **MAHON EQUIPMENT** is the item of **GREATEST VALUE to YOU!**

MAHON

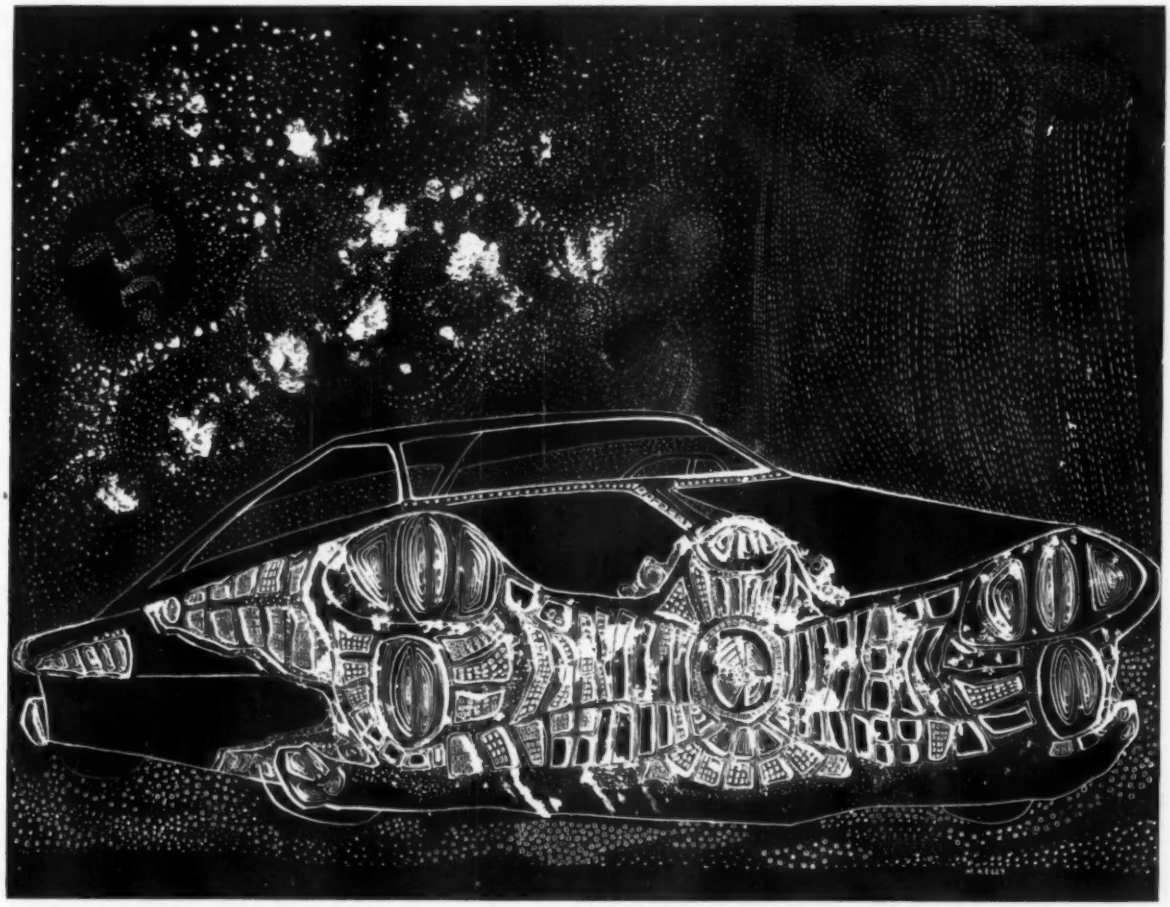
nightmare alley

If a car could dream, what stuff would its nightmares be made of? Untranquilized, tossing feverishly in its carport, it would fall prey to that ramshackle specter that haunts all denizens of the road. From its mechanical libido would emerge boogermen built of road salt, sea air, sand storms and freeze . . . enough to frighten any motor car right out of its trim.

Save that tender, quaking soul! Insure Valhalla by prescribing a liberal dose of Stainless Steel to last a lifetime . . . and to last without the bother of pads, polishes or protective fluids.

Actually, you'll be doing yourself a favor because Stainless Steel has sales appeal! Trim your new model with copious quantities of Stainless Steel and *tell* your customer about it. He already knows what a miracle metal Stainless is, but may not know that there is any on your car. As for yourself, you're surely aware that Stainless Steel trim often costs less than other materials because there are fewer fabricating steps, you can use thinner gages because it is so strong, and there is no need to overdesign to allow for corrosion or impact damage.

USS is a registered trademark

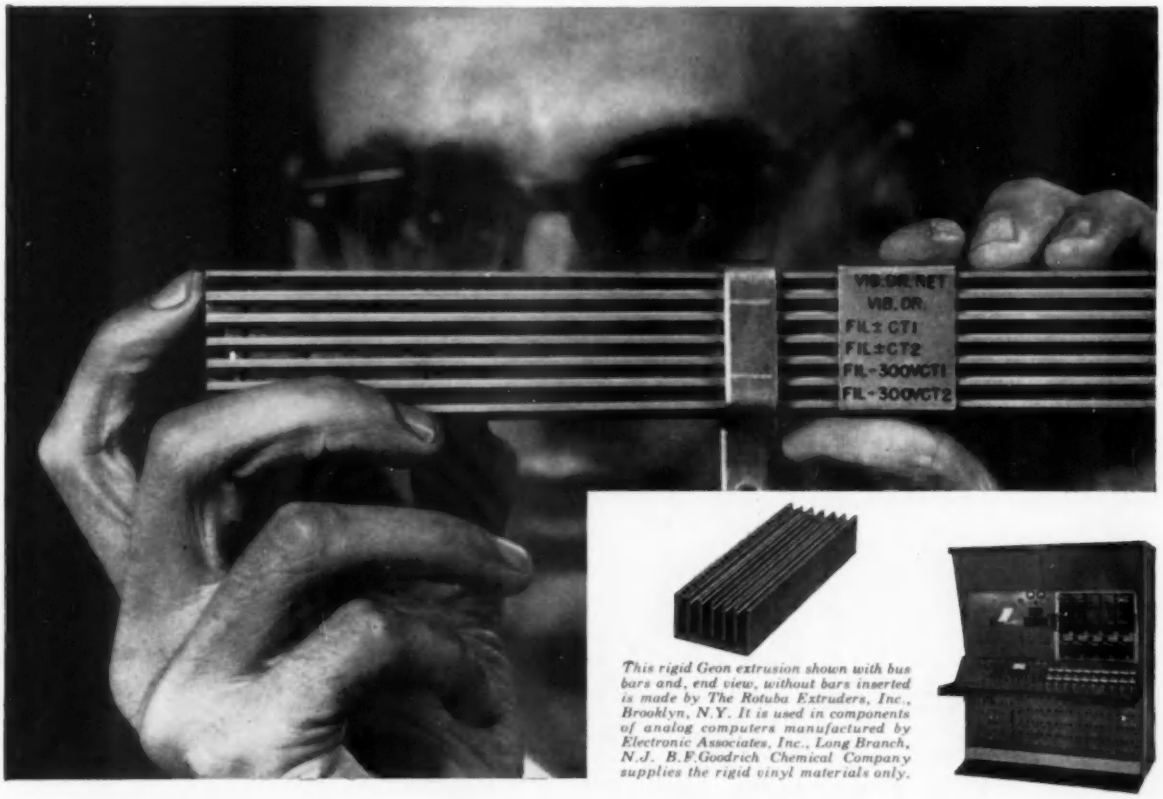


United States Steel Corporation—Pittsburgh
American Steel & Wire—Cleveland
National Tube—Pittsburgh
Columbia-Geneva Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Supply—Steel Service Centers
United States Steel Export Company

USS **United States Steel**

Another new development using

B.F.Goodrich Chemical *raw materials*



This rigid Geon extrusion shown with bus bars and, end view, without bars inserted is made by The Rotuba Extruders, Inc., Brooklyn, N.Y. It is used in components of analog computers manufactured by Electronic Associates, Inc., Long Branch, N.J. B.F.Goodrich Chemical Company supplies the rigid vinyl materials only.

Extrusion of rigid Geon

. . . cuts bus bar insulation costs, saves assembly time

This extrusion of Geon rigid vinyl material saves cost, time and space for electrical assemblies. It is used to retain and insulate six strip-type bus bars of varying voltages up to 600 volts DC. They can be placed closer together because of rigid Geon's high dielectric strength and high insulation value.

Rigid Geon brings material costs down, too, for this application. It also shortens assembly time and saves weight and space.

In addition, the use of extrusions made from Geon rigid vinyl material provides good chemical and abrasion resistance. If desired, they can be colored for coding purposes. It's another example of the way Geon rigid vinyl can be the key to a new or improved product or application. For information, write Dept. LN-6, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

B.F.Goodrich Chemical Company
a division of The B.F.Goodrich Company

SEE US AT BOOTH NO. 509
8TH NATIONAL
PLASTICS
EXPOSITION
NOV. 17-21
INT'L AMPHITHEATRE-CHICAGO

B.F.Goodrich

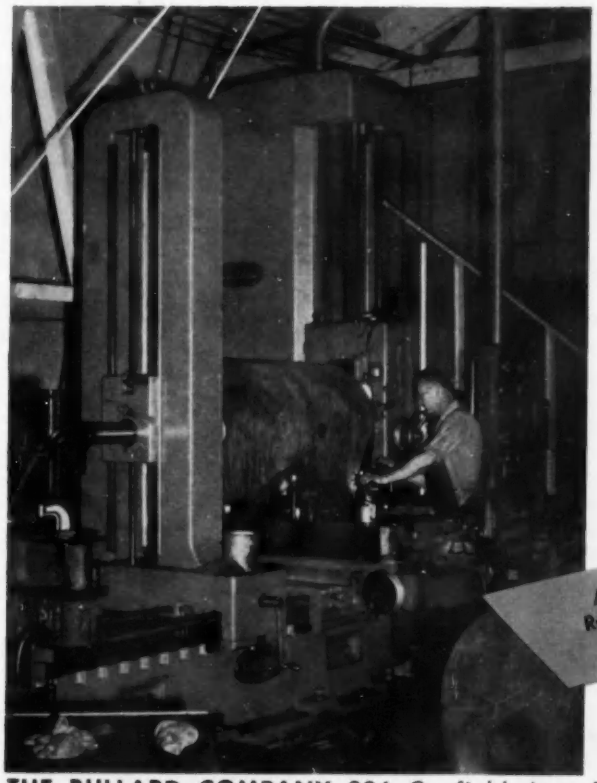
GEON polyvinyl materials • HYCAR American rubber and latex
GOOD-RITE chemicals and plasticizers • HARMON colors

Circle 264 on Inquiry Card for more data

"To meet Today's and Tomorrow's Complex Machining Problems

we bought a . . .
"BULLARD"
H.B.M. model 75

This statement by Mr. Reed Clark, General Manager, C. & H. Machine and Engineering Company, Berkeley, California summarizes, after thoroughly investigating and comparing competitive machines, their conclusion.



If you are planning to purchase a horizontal boring machine, we invite you to compare, feature for feature, the Bullard H.B.M., Model 75 with other machines in its field. You will discover that — "To Cut Costs When Cutting Metal — Buy Bullard" — is sound advice.

A call to your Bullard Sales Representative or Distributor will bring you the complete story.

BULLARD

THE BULLARD COMPANY 286 Canfield Ave. Bridgeport 9, Connecticut

Circle 265 on Inquiry Card for more data

NEW! High-pressure supercharging at low rotor speeds with Thompson Turbocharger

Simple, straight rotor vanes enable the new-design Thompson Turbocharger to produce economical high-pressure blowing of diesel engines even at low rotor speeds. Wear on parts is reduced, maintenance and downtime are kept to a minimum.

In the development labs of the Tapco Group, impeller vane contours were developed to make use of Thompson's two decades of experience in high efficiency movement of air and gases.

Other *new* features of Thompson Turbochargers include unique small-diameter shaft and bearing to provide lower shaft surface speeds at equal compression ratios. Bearing and shaft wear is kept to a minimum. In addition, unique Thompson design keeps exhaust heat from traveling to bearings and compressor side of the Turbocharger.

If you build supercharged diesel engines up to 300 horsepower, we can supply a Thompson Turbocharger to provide even more horsepower and fuel economy. If you install diesel engines in trucks or diesel-powered equipment, you'll increase horsepower without increasing engine size by specifying Thompson Turbochargers.

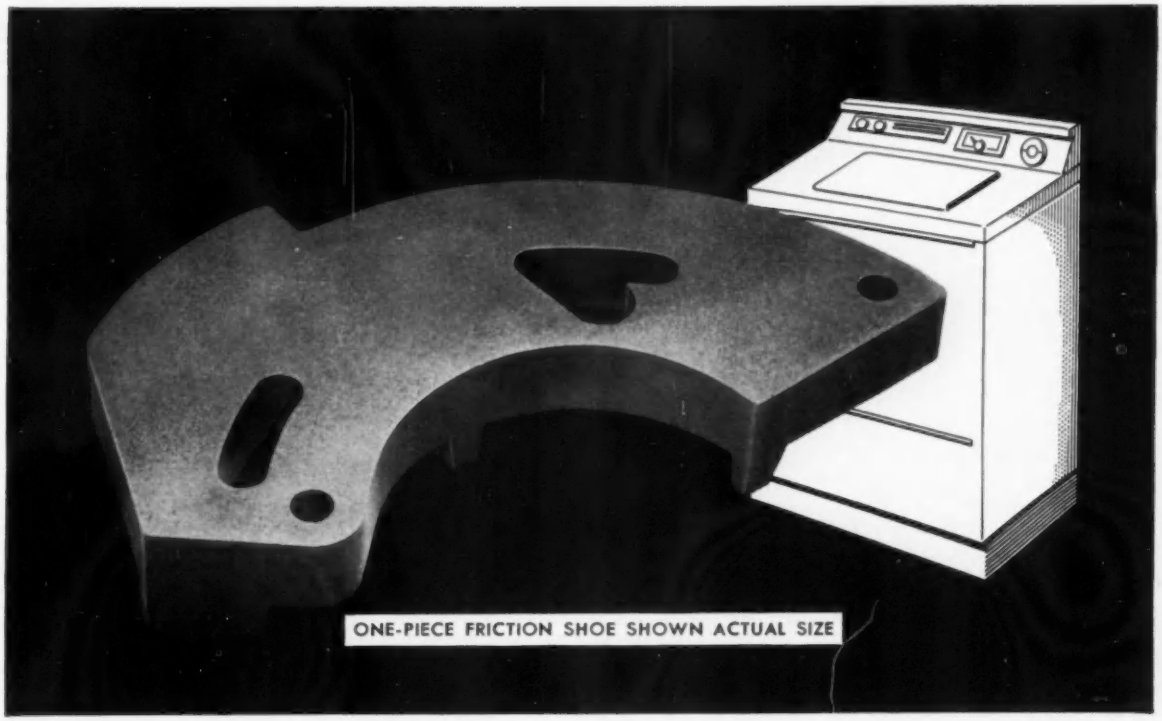
Our sales engineers will help you make the switch to Thompson Turbochargers with practically no redesign of exhaust or intake side. When may they call?

Write today on your company letterhead for Booklet AI-1158, which contains technical data on Thompson Turbochargers for blown diesel engines up to 300 horsepower.

TAPCO GROUP
Thompson Products, Inc.
CLEVELAND 17, OHIO

Circle 266 on Inquiry Card for more data

ANOTHER EXAMPLE OF HOW CONTINUING RESEARCH KEEPS R/M FIRST IN FRICTION



R/M structural part made of friction material cuts costs 75%

This is a centrifugal clutch shoe for an automatic clothes washer. The old way you'd make it by bonding friction material to a steel member. R/M now makes it by molding the whole part of friction material—a special new type. And the manufacturer cuts the cost of the shoe 75%.

Cutting costs for customers is nothing new at Raybestos-Manhattan. We've been doing it for over 55 years. R/M has more extensive test facilities—and spends more on testing—than any other friction material manufacturer. Our many customers—prospects too—come straight to us for their own development testing. As a result we've amassed a wealth of knowledge about molded, woven, metallic and ceramic friction material behavior that is setting the pace for the industry.

Unlike other manufacturers, R/M works with all types of friction materials. Constantly testing, exploring, developing in advance of today's needs, R/M is finding new and profitable answers to friction problems you may be facing now. And with the number of sales engineers we have in the field, we can have a man at your desk on any problem within 24 hours.

Whatever your requirements, whatever your application, whenever you think of friction, think first of R/M.

Write now for your free copy of R/M Bulletin No. 500. Its 44 pages are loaded with practical design and engineering data on all R/M friction materials.

RM FIRST IN FRICTION

RAYBESTOS-MANHATTAN, INC.

EQUIPMENT SALES DIVISION: Bridgeport, Conn. • Chicago 31 • Cleveland 16 • Detroit 2 • Los Angeles 58

RAYBESTOS-MANHATTAN, INC., Brake Linings • Brake Blocks • Clutch Facings • Sintered Metal Products Industrial Adhesives • Mechanical Packings • Asbestos Textiles • Industrial Rubber • Rubber Covered Equipment • Engineered Plastics • Abrasive and Diamond Wheels • Laundry Pads and Covers • Bowling Balls

Circle 267 on Inquiry Card for more data

The *Newest* ACME Model HA THREADING MACHINE

ACME Model HA (heavy duty) Single Spindle Threading Machine 2" capacity.

New Design

New Production Features

New Built-in Precision

New Versatility

Wide Speed Range: The Acme Model HA has eight spindle speeds assuring correct speeds for various diameters and materials to be threaded.

Adjustable Carriage: Adjustable both horizontally and vertically to permit alignment with the die head.

Hardened and Ground Ways: Rectangular ways guide and support the carriage insuring precision alignment and smooth carriage travel.

Ask for bulletin HAT giving description and complete specifications.

The Acme Model HA is adaptable to either tangential or hob type die heads using tangential or hob type chasers of standard design. Model HA Threaders are built in 1", 1½", 2" and 2½" capacities in single or double spindle design.

THE HILL ACME COMPANY

ACME MACHINERY DIVISION • **1209 W. 65th St., Cleveland 2, Ohio**
ESTABLISHED 1882

"ACME" FORGING • THREADING • TAPPING MACHINES • ALSO MANUFACTURERS OF "HILL" GRINDING & POLISHING MACHINES HYDRAULIC SURFACE GRINDERS • "CANTON" ALLIGATOR SHEARS • BILLET SHEARS • "CLEVELAND" KNIVES • SHEAR BLADES

Circle 268 on Inquiry Card for more data

THE EASY WAY TO PREVENT CORROSION IN YOUR PRODUCT? SPECIFY ZINC-COATED STEEL SHEETS, OF COURSE!

There's just nothing like zinc-coated steel sheets for enduring, economical corrosion prevention in the products you manufacture such as light troffers, metal ceiling tiles, baseboard heating units, sliding door hardware and scores of other products.

Take the formability of such sheets, for instance. With either electrolytic or continuous process zinc-coated steel, the tight coating can take the severest fabrication operations and never flake or peel. Result: permanent corrosion resistance for longer life and lasting beauty. First cost: low. Maintenance costs: nil.

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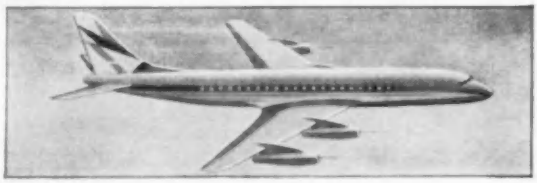

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CALENDAR

OF COMING SHOWS AND MEETINGS

3rd Industrial and Building Sanitation Maintenance Show, Convention Hall, Philadelphia, Pa. Nov. 3-6

Society of Vacuum Coaters, fall meeting and technical conference, Hotel Statler, Detroit, Mich. .....Nov. 5-6

Industrial Management Society, annual industrial engineering and management clinic, Hotel Sherman, Chicago, Ill. .....Nov. 5-7

National Machine Tool Builders' Association, annual meeting, The Homestead, Hot Springs, Va. .....Nov. 5-7

40th International Motor Show, Turin, Italy .....Nov. 5-16

SAE National Fuels and Lubricants Meeting, The Mayo, Tulsa, Okla. .....Nov. 6

National Defense Transportation Association, 13th annual national convention and logistics form, St. Louis, Mo. .....Nov. 9-12

American Petroleum Institute, 38th annual meeting, Conrad Hilton, Palmer House and Congress Hotels, Chicago, Ill. .....Nov. 10-12

National Meeting of the Society for Experimental Stress Analysis, Sheraton-Ten-Eyck Hotel, Albany, New York....Nov. 12-14

Eighth Aircraft Hydraulics Conference, Park Shelton Hotel, Detroit, Mich. .....Nov. 12-14

Cycle and Motor Cycle Show, Earls Court, London .....Nov. 15-22

National Plastics Exposition, Chicago, Ill. .....Nov. 17-21

National Conference on Air Pollution, Sheraton-Park Hotel, Washington, D. C. .....Nov. 18-20

Ninth National Conference on Standards, Hotel Roosevelt, New York .....Nov. 18-20

Manufacturing Chemists' Association, 8th semi-annual meeting and winter conference, Hotel Statler, New York City .....Nov. 25

First Electronic Computer Exhibition, London .....Nov. 28-Dec. 4

American Society of Mechanical Engineers, annual meeting, Statler and Sheraton-McAlpin Hotels, New York ....Nov. 30-Dec. 5

2nd National Symposium on Global Communications, St. Petersburg, Fla. .....Dec. 3-5

Smithfield Show and Agricultural Machinery Exhibition, Earls Court, London .....Dec. 8-12

125th Annual Meeting of the American Association of the Advancement of Science, Washington, D. C. .....Dec. 26-31

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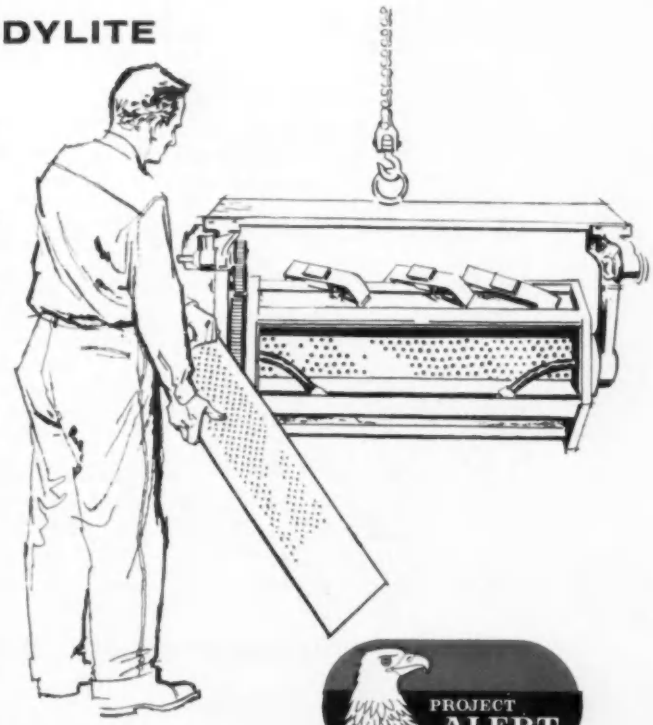

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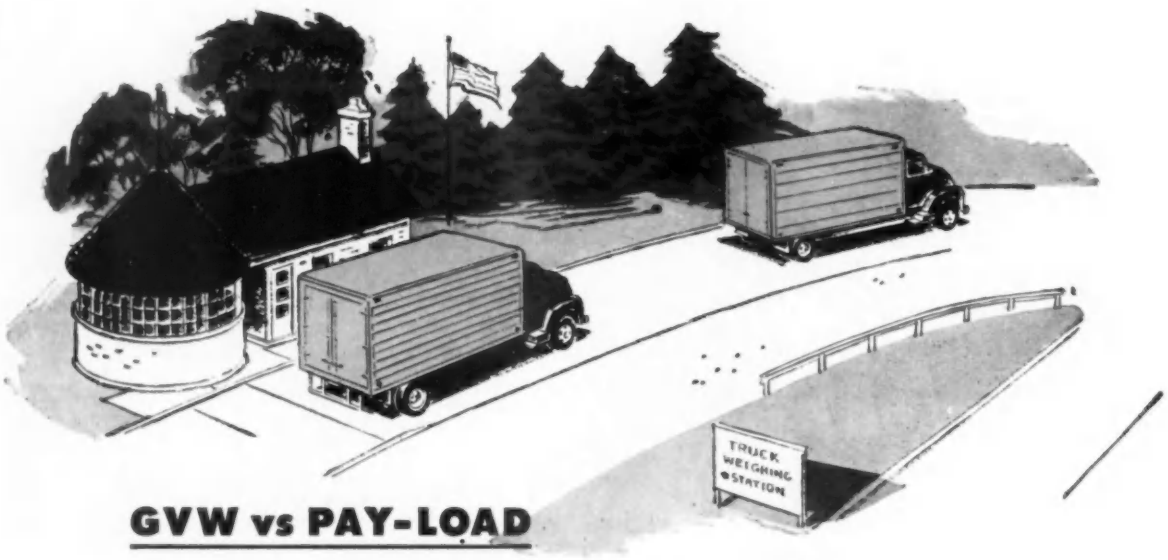

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High Spots of This Issue

▼ Studebaker-Packard Unveils New Lark

Studebaker-Packard's answer to the growing small car market in this country is the new Lark, which is offered in three body models with either a Six or V-8 engine. S-P launches only one model in a larger package—the 1959 Silver Hawk sport coupe. Page 48.

▼ British Trucks and Buses Stage Comeback

The British truck and bus industry has been in a slump for the past two years, but production now is climbing back to the 1955 peak and domestic sales are up. In this full-length report, David Scott covers the latest design trends—disk brakes, air suspension, automatic transmission, power steering and forward control cabs—which have contributed to the industry's present resurgence. Page 50.

▼ Mercury Launches 20th Anniversary Models

Mercury takes on a new look on its 20th anniversary. Its cars boast new bodies and chassis, not shared by any other division of the company. Besides styling changes, this article discusses improvements in the suspension, steering, and brake systems. Page 60.

▼ CO_2 Arc Welding in Automotive Plants

A new CO_2 arc welding process that uses larger and less costly wire and needs less current has been installed in several automotive body and vehicle assembly plants. This article discusses how it works and where it is being applied. Page 64.

▼ 25 New Product Items And Other High Spots, Such As:

GM small car; GMC tractors; 1959 Edsel; Ford tractor-loader; 1959 Lincoln and Continental; news of machinery industries; and industry statistics.

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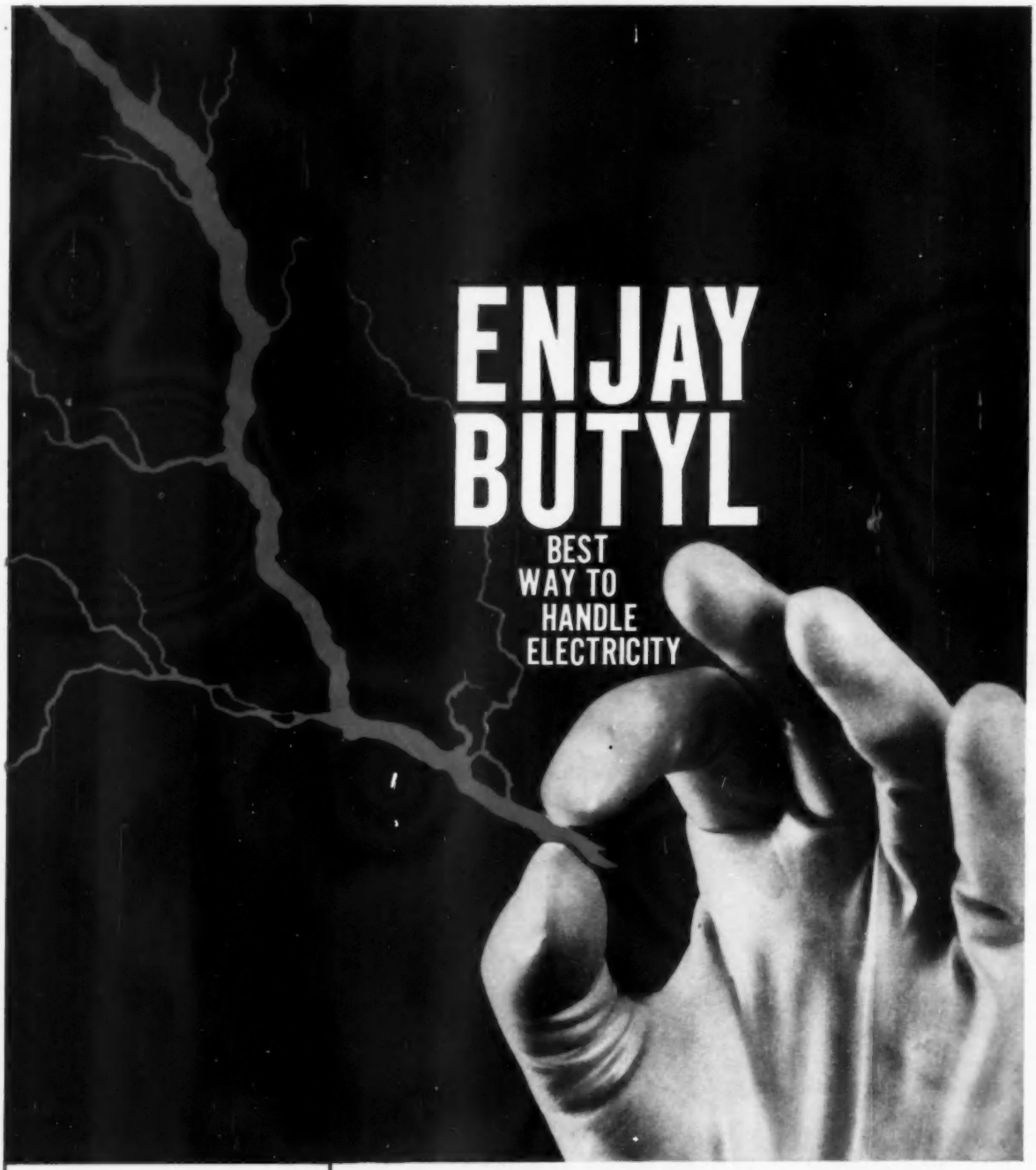

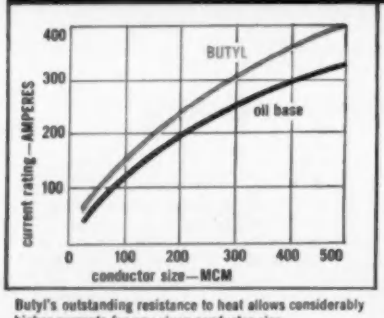

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News

OF THE AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 119, No. 9 **November 1, 1958**

Industry Off to Slow Start As Strikes Hamper Output

The automobile industry got off to a slow start on 1959 model production as local strikes hampered output at all of the Big Three manufacturers.

As a result, dealers did not have enough cars for a proper new model announcement. Dealers stocks by mid-October were the lowest in four years, down below 200,000 cars, or about half a month's supply.

Unfortunately, signing of the three-year national agreements with the United Auto Workers did not signal a return to work. Local differences still were unsolved, and each plant was left to work out its own solution with the union.

General Motors was hardest hit. All 126 GM plants were shut down in the early days of October, and settlement was piecemeal. The complex of supply lines within the corporation made return to full production a slow process.

Cadillac, for example, settled its local contract October 20 but could not return to work because Fisher Fleetwood still was not settled. The same situation was true in Pontiac, where Fisher was unable to supply the assembly plant with bodies.

Chrysler's first day of uninterrupted production came some two months after 1959 production began in mid-August. With Chrysler, it was a matter of unauthorized strikes at various plants, as well as the slow process of local settlement.

Only Ford, of the Big Three, was able to hold its production schedules during October. Ford had a few days of down time at the Rouge assembly plant in Dearborn following contract signing in September, but peace followed closely.

Studebaker-Packard was the last of the automobile companies to reach a national agreement. American Motors signed Oct. 17, the strike deadline day, just seven hours after workers walked off their jobs. But production resumed the next day.

Production during November and December will be at full speed, as the automobile companies race to replenish dealer stocks.

Meanwhile, the automobile companies reported high advance orders and public acceptance of the new offerings. MEL Div., for instance, said the backlog of dealer orders was more than the plants could produce through November.

Buick's first full 10-day period orders totaled 27,880, but the division was able to deliver only 12,260 cars. Orders were more than double the same period of the '58 model year.

Dodge reported that initial demand was "more than double" that of a year ago. Many dealers sold out their limited stocks within 72 hours after announcement.

American Motors, reporting a record number of Rambler orders, boosted production schedules to 1150 a day in mid-October, the fourth boost since 1959 model production began. The company said dealer orders through Nov. 30 total 72,400 cars, more than double the order position of a year ago.

AMC has scheduled 100,000 units through December. Output for September hit a new high, according to the company, with 19,141 units. This topped the previous high of 18,999 units built last May.

JAGUAR ADDS NEW MODEL TO 1959 LINE

Jaguar's newest luxury model, the Mark IX sedan, had its first world showing in New York last month. The Mark IX is powered by a six-cylinder, 225-hp engine equipped with twin carburetors. The new sedan features a new automatic transmission with fingertip control that enables a lower gear to be held indefinitely; a new brake pedal position that permits use of either left or right foot; a sliding sun roof; power steering; and four wheel disk brakes. Price of the car was not announced.

GM Chairman Warns of Need For Risk To Aid Progress

General Motors' new board chairman Frederic G. Donner, in his first

NEWS AUTOMOTIVE AND AVIATION

ASTON MARTIN HAS ALUMINUM ENGINE

Aston Martin DB4, made in Britain by David Brown, is claimed to have the highest performance of any four-passenger production car. The new six-cylinder twin-overhead camshaft engine of 224-cu in. displacement is rated at 240 bhp at 5500 rpm. It has an aluminum alloy head and block with centrifugally cast liners, a seven-bearing crankshaft, and twin 2-in. S. U. carburetors. The four-speed gearbox drives through a hypoid axle with three ratios available. All wheels have Dunlop disk brakes and are suspended by coil springs, with parallel trailing at the rear. The aluminum-panelled body uses a tubular frame in unit with the steel platform chassis.

major public appearance, warned that "calculated risks" are necessary to aid the nation's economic recovery and for further growth.

Donner addressed a luncheon of top business leaders at GM's new Motorama in New York.

"There is," he said, "a need for our government officials to take calculated risks and, in times of doubt about the direction of economic trends, to give the benefit of the doubt to policies which encourage investment."

He added that conditions favorable to risk-taking and change should be preserved so that a "high level of output and goods and services will be assured."

GM's new president, John F. Gordon, cited as an example of constructive change the annual model change in the automobile industry.

All five new GM passenger car lines, incidentally, were highlighted in the Motorama exhibits and presentations. As Gordon pointed out, this marks the first time in history that all GM car lines have been new in the same year.

Alfred P. Sloan, Jr., honorary chairman of GM, revealed the extent of the '59 change when he said the new products were brought out at a cost of more than $500 million.

At an earlier news luncheon, Donner said that passenger car production during 1959 should approximate 5.5 million cars. He also commented on GM's small car plans, saying that GM has not yet reached the "point of no return" in production planning.

Lark Orders Top 30,000, Prices Start at $1756

Dealer orders for Studebaker's new Lark passenger car topped 30,000 several weeks before public announcement date and gave S-P management plenty of reason to be optimistic.

Orders amounted to nearly 60 per cent of the company's production for the entire 1958 model year, which was some 49,000 cars. The car represents a new effort by S-P to retain a secure spot in the American passenger car picture.

The car is low-priced. Prices start at $1756 for the Deluxe Six two-door sedan, running to $2362 for the Regal V-8 station wagon. Four models are priced below $2000 at the factory.

S-P president Harold E. Churchill, speaking at a press preview of the new Lark, said that the new car is "out to capture an important share of the fastest growing segment of the American automobile market."

Churchill would not make a prediction of how many cars he expected to sell, but he did point out that the South Bend plant has sufficient capacity to build 280,000 cars during the year.

Production in mid-October was at the rate of 370 units a day, well above the 1958 average.

Churchill said the new car was brought out at a "modest budget" which permits the low price. There are economies, he explained, in model lineup (nine instead of the 18 in 1958), paint (seven colors instead of 13, and no two-tones), and interior trim (one basic fabric).

Six cylinder or V-8 engine is available. The L-head six develops 90 hp with 169.6-cu in. displacement and an 8.3 compression ratio. The V-8 is rated at 180 hp with 259.2-cu in. displacement and 8.8 compression ratio.

Ford Market Planners Waiting For Panel's Reaction to Cars

Ford Motor Company marketing experts are waiting for the results of a month-long testing program involving a panel of 400 consumers and the new Ford products.

Ford sponsored a national consumers conference last month to find out the public's views on automobile styling, performance, engineering and other aspects of produce planning. After a two-day conference with Ford officials, the panel delegates were loaned a 1959 Ford car to test drive for a month.

Dr. George Gallup, who selected the cities to be represented, will evaluate the delegates' reports at the end of this month.

During the two-day conference in Detroit, Gallup met with the panel members in a closed session, with no Ford representatives, to solicit views and comments on the automobile industry and its products and policies.

The Ford conference points up the value of market research in today's automobile industry. Dr. George H. Brown, Ford Div. marketing manager, emphasized the role of research when he told the delegates that the industry spends some $6 million a year in market studies.

He pointed out that the Ford retractable hardtop, four - passenger Thunderbird and station wagon all were developed as a direct result of customer surveys.

Chrysler Corp. Prices Up But Plymouth Prices Drop

Most of the Chrysler Corp. cars for 1959 show slightly higher factory prices, although Plymouth reduced the price on all but its Belvedere convertible and Suburban station wagon models.

The only other prices which did not rise were the four models of the

Imperial Crown series, which remained identical to 1958 prices.

Plymouth cut the price on the Savoy sedans by $26 and on the Belvedere sedan and hardtop models by as much as $8. A full $135 was chopped off the price of the Sport Fury two-door hardtop model.

Station wagon increases range from $109 to $139.

But gone from the lineup is last year's price leader, the Plaza line. The lowest priced model this year is the Savoy business coupe, a new entry, at $1944.

Dodge increases range from $34 for the Sierra Spectator station wagon to $133 for the Royal Lancer four-door. The complete line ranges from $2283 for the Coronet 6 club sedan to $3141 for the Custom Sierra Spectator.

At DeSoto Div., the price hikes were kept below $86. Smallest increase is in the Fireflite four-door sedan price, up $29 over last year. Prices now range from $2636 for the Firesweep four-door sedan to $4331 for the Adventurer convertible.

Chrysler Div. raised prices for the Windsor and New Yorker series by $60 and for the Saratoga series by $87. Imperial raised the Custom series prices by $52 and the Le Baron series by $102.

Prices of options remain generally unchanged. Plymouth's Golden Command engine, this year with 361 displacement, is an $80 option. Chrysler Div. has made power brakes standard instead of optional on the Saratoga and New Yorker lines.

Ford Motor Co. Hikes Prices On All But Corsair, Premiere

Ford Motor Co. boosted prices on all 1959 passenger car models except the Edsel Corsair series and the Lincoln Premiere.

Increases range from $31 on the Edsel Villager station wagon to $670 on the Continental Mark IV series.

Prices for the Edsel Corsair were cut $494 on the two-door hardtop and $505 on the four-door hardtop. The Lincoln Premiere price was cut by a token $1.00.

In the Ford line, prices for the Custom 300 are $135 higher in all three models; $112 higher in the Fairlane series; and $82 higher in all Fairlane 500 models except convertibles, which are up as much as $161. Station wagon increases range from $139 to $162.

Ford holds the price advantage over Plymouth and Chevrolet at the low end of the line, despite the $135 increase in the Custom 300 series. This is because Chevrolet has dropped its Del Ray series and Plymouth has dropped its Plaza, making the Biscayne and Savoy the lowest price lines in those two makes.

Price increases in the Edsel Ranger series range from $68 for the four-door hardtop to $98 for the two-door sedan. There is no Pacer or Citation series in 1959.

Mercury's biggest increases are in the Voyager ($115) and Colony Park ($114) station wagons. Other hikes range from $34 in the Montclair and Park Lane series to $89 in the Monterey. Lowest price Mercury is the Monterey two-door sedan at $2511.

Lincoln is offering a new Lincoln series in place of the Capri, with prices from $64 to $101 higher than comparable 1958 models.

Thunderbird prices are up $38 for the hardtop and $101 for the convertible.

HUMBER SUPER SNIPE POWERED BY NEW ENGINE

Latest Humber Super Snipe, at the luxury end of the Rootes Group's range, is produced as a station wagon, limousine, and sedan. It is powered by a new six-cylinder engine developing 112 bhp at 5000 rpm. Of square design, with 3.25-in. bore and stroke, the 161.8-cu in. unit has a flat-curve torque characteristic with a maximum of 137 lb/ft held from 1600 to 2400 rpm. Design features include hemispherical combustion chambers with angled valves, a high-level camshaft running in a full-length oil bath, and short pushrods. Optional transmissions are a Borg Warner automatic and a three-speed, all-synchronized gearbox with overdrive.

GMC Looking for 21 Per Cent Rise in Truck Sales in '59

GMC Truck & Coach Div. is looking for a 21 per cent rise in truck sales during 1959, with total industry sales of 1.1 million vehicles.

Revival of home-building, stimulation of the highway program and increased public spending will boost the market to some 900,000 domestic deliveries and 200,000 export sales, according to GMC general sales manager R. C. Woodhouse.

Estimated sales for 1958 will total between 730,000 and 740,000 domestic and some 160,000 Canadian and export sales, he added.

Woodhouse, speaking at a preview of the new GMC truck models in New York, told the press that GMC truck sales have been rising since last February. August was the highest month since April, 1957.

GMC is getting ready to produce two new tilt-cab models in the 60,000 and 76,000 gcw classes. The units employ air ride and independent front wheel suspension. They are designed for payloads of from 699 to 2097 lb more than comparable models, according to Philip J. Monaghan, General Motors vice-president and general manager of the truck division.

One new model will go into production in November and the second unit will start in production after Jan. 1.

Monaghan also told the group that GMC has "no surety" that the gas turbine engine ever will be developed to a point of efficiency comparable to piston engines for truck use. At the present time, he said, such a turbine costs around $35,000, tooled for semi-production.

Fisher Adopts Dielectric Process for Interior Trim

Fisher Body Div. is using dielectric heating to produce interior trim for automobiles in all five GM divisions.

The process uses electricity to generate heat within a material instead of forcing heat into the material through hot plates or blades.

Dielectric heating is used in the embossing process which cements certain joints in upholstery materials and imprints decorative effects. Fisher says the process works well with foam rubber and felt.

Here is the way Fisher Body's dielectric embossing works: The trim material, backing and adhesive is sandwiched between the two emboss-

ing plates or blades, just as in hot platen embossing. But instead of a direct heat application, as in the hot platen technique, an electric field is set up between the two plates.

With oppositely charged plates and an alternating current, the molecules of the trim material and adhesive generate their own heat. Voltage may be as high as 4000; frequency is 14 million cycles per second. The process can heat an adhesive to 325 F in 10 seconds.

Fisher Body worked out the dielectric process to produce complex interior trim combinations more economically than by sewing them together.

Automobile Industry Will Use More Magnesium, Dow Predicts

A major boost in use of magnesium by the automobile industry during the next two years is predicted by Dow Chemical Co., the only commercial magnesium producer in the U. S.

Dow's prediction may indicate the company is ready to lower its primary magnesium price to compete more favorably with the aluminum industry for some of the light metal applications in cars and trucks. Chilton's *The Iron Age* lists aluminum pig at 24.7 cents a pound, magnesium pig at 37.25 cents.

Accurate figures on the use of magnesium in current model cars are not available, since much of the magnesium appears as alloying agent for aluminum. An estimate of 5 lb per car, however, is termed "generous."

Dow's production a year ago totaled 79,000 tons, of which about 3 per cent went directly to the automobile industry. The aluminum industry itself is a big user of magnesium.

One development that could bring about a price cut is the new magnesium plant now under construction to be operated jointly by Brooks & Perkins, Inc., and Calumet-Hecla. Full production at the plant in Alabama is expected before the end of 1959.

Brooks & Perkins, incidentally, is one of Dow's best customers and Dow will have to take steps not only to meet the competition of a new producer but also to replace lost business.

Dow uses an electrolytic process and a sea water base for producing its magnesium. Brooks & Perkins will use a thermal system and dolomite base, believed to be much less expensive than the Dow process.

According to E. L. Schaper, manager of die casts sales for Dow, some of the logical new uses for magnesium in automobiles are in transmissions and housing, steering gear parts, engine accessories, and interior trim.

Schaper, along with Dow automotive development engineer H. A. Schertel, says current model cars could use an average of 80 lb of magnesium in applications that already have been successful production items.

Some of these production items include timing gear, oil pump, engine fan, crankcase, transmission stator blade and support bracket, clutch housing, torque converter housing and steering column shroud and bracket.

The two men made their report at the 14th annual convention of the Magnesium Association held in Detroit in October.

Dow currently is the world's largest magnesium producer, followed by the Norwegian industry with 9500 long tons annually. Volkswagen is Norway's largest single customer, using 40 lb per car.

Aluminum Now Competitive With Cast Iron, GM Engineers Find

Aluminum now is competitive with cast iron from a cost standpoint, according to two General Motors engineers who have been experimenting with aluminum engines.

Thus, one of the major obstacles to the use of the aluminum engine has been overcome, paving the way to actual introduction within a few years.

The reports from the two GM engineers, Darl F. Caris and Dr. Robert F. Thomson, renewed speculation in Detroit that the aluminum engine will make its bow on at least one 1960 model GM car and possibly a second.

Caris, of GM Engineering Staff, says improved foundry, machining, and casting techniques have brought the price of aluminum within range of cast iron. Another important factor is location of foundries adjacent to aluminum reduction plants so that molten metal can be poured directly to the foundry.

Both GM and Ford now have aluminum foundries next to reduction plants, GM in New York state and Ford in Alabama.

Caris told the Gray Iron Founders' Society at a recent meeting that an important breakthrough in aluminum engine research is the application of high wear resistant alloys that eliminate the need for cylinder liners.

According to Thomson, these alloys, including high silicon materials, have shown satisfactory wear characteristics in dynamometer and field tests with experimental V-8 engines.

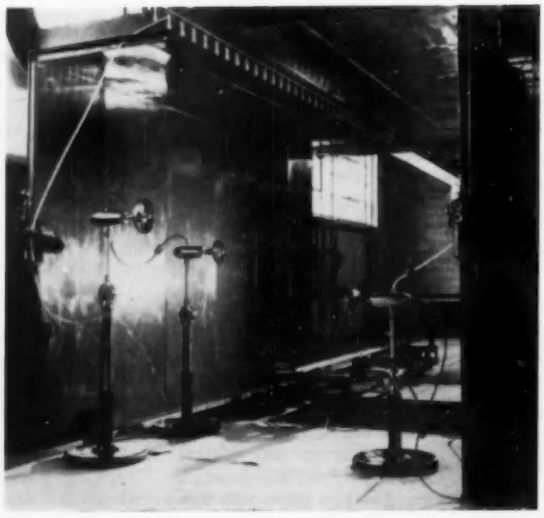
Thomson told the society that recent studies have covered various cylinder bore coatings, including chromium plate, iron plate, electroless nickel plate, oxide coatings, sprayed steel, sprayed molybdenum and sprayed aluminum.

If none of these coatings or alloys should meet all final requirements, he added, a cast iron liner could be used.

Thomson said that aluminum castings are more expensive per pound than iron castings, but the aluminum engine's light weight makes up for the difference.

RANSBURG LABORATORY

Ransburg Electro-Coating Corp. recently occupied a new, modern plant on outskirts of Indianapolis. Shown here is one of the conveyorized laboratories used for test painting big products, such as automobile bodies. The product is moved through the electrospray area either on a floor-based dolly or an overhead conveyor. Bell-type No. 2 Process atomizers are shown in place. New plant is part of firm's $1.5 million expansion and building program.



He explained that diecasting, permanent mold or semi-permanent mold methods are possible, along with green and dry sand casting of both integral bore blocks and inserted liner blocks.

Ford Motor Company Loses $21.6 Million in 3rd Period

Ford Motor Co. losses in the third quarter totaled $21.6 million, making the net loss for the first nine months of the year $16.2 million. Sales for the quarter amounted to $695.6 million.

Ford made money in the first three months, but losses in the next six operating months erased the profit. Henry Ford II, however, indicated the possibility of a profit in the final period.

He said that production is proceeding at an accelerated pace in Ford plants, and if production and sales continue at present schedules there should be a profit for the period.

Ford's net sales for the nine months totaled $2582.9 million, a drop of 39 per cent from the $4419.2 million rung up a year ago.

Unit sales of cars and trucks for the nine months totaled 934,054, compared with 1,742,208 a year ago.

Next Big Step in Car Design Outlined by Ford Official

The next big step in automobile design, according to an official of Ford Div., will be in the development of lighter vehicles with more efficient engines.

Weight reduction will flow from new techniques with light metals, such as aluminum and magnesium, according to Will Scott, product planning manager for the Division. And super-efficient engines may well stem from what is being worked on today in fuel injection systems, he added.

Scott, speaking in Detroit, said the next step will be to increase efficiency and reduce operating costs without decreasing car size.

Manual Transmission Standard On All 1959 Dodge Div. Models

Dodge Div. announced that the manual three-speed transmission is standard on all of their 1959 models —including the Royal, Custom Royal, and Custom Sierra station wagon.

This announcement followed an earlier Dodge statement, published in AI (Oct. 15, p. 116), that automatic transmissions were standard on the three top lines.

AI TABLOID

Allis-Chalmers developed a fuel cell that converts hydrogen and oxygen gases into direct current. The device consists of 24 separate cells, each having two metal electrodes coated with a catalyst. The fuel cell, still in the experimental stage, produces enough electricity to light two 15-watt light bulbs.

* * *

National Bureau of Standards experiments on metal fatigue cracking show that the preponderance of edge cracks in most metals is caused by the stress pattern rather than by lower fatigue strength at the edges, as was previously believed.

* * *

Babcock & Wilcox Co. is trying two new approaches to low-cost production of nuclear energy. The first method eliminates control rod systems by using mixed "light" and "heavy" water to control pressurized and boiling water reactors. The second involves the use of a new low-pressure coolant consisting of fine particles of solids suspended in gas, thereby reducing the size and cost of major components.

* * *

A new silver brazing alloy containing lithium has been developed by American Silver Co. for joining high-temperature stainless and other aircraft steels. Called Fluxless Nu-Braze No. 0070, the new alloy has a melting range of 1435 to 1635 F. It contains 0.2 per cent lithium, 92.5 per cent silver, and the balance copper.

* * *

General Electric's new thermoplastic, Lexan, is now available in commercial quantities, the company announced. Designed primarily as a molding material, Lexan may also be used in the form of film, extrusions, coatings, fibers, or elastometers, the company said.

* * *

Minneapolis-Honeywell Regulator Co. has increased its plant capacity at Beltsville, Md., by 40 per cent to meet the demand for high-speed data-recording equipment. Latest addition to Beltsville's line is a digital recorder-transcriber that handles up to 10,000 samples of analog information per second and converts this to digital form for computer processing.

Hydrometals, Inc., acquired exclusive world-wide licensing rights to a new electro-thermal reduction process developed by Electro-Thermal Industries. Metallic oxides placed in a closed chamber are subjected simultaneously to temperatures and pressures as high as 5000F and 500 tons psi, respectively. A low-voltage electrical charge starts an intense electro-thermal reaction resulting in an almost instantaneous reduction of ores to the metallic state. The company says the new process can be applied to a large number of metals that now require costly and involved reducing techniques.

* * *

The problem of measuring tolerances as small as 5 or 6 millionths of an inch on ball bearings used in weapons guidance systems can be solved by the "Talyrond," a British-built roundness measuring instrument, says Miniature Precision Bearings, Inc. The gaging instrument features a precision spindle which runs true within 0.000003 in. As the spindle rotates, an attached stylus-pickup arrangement contacts the specimen and via an amplifier to a recording mechanism the instrument draws a polar diagram of the radial deviations of the specimen from a true circle. Talyrond can be adapted also to measure all the geometrical properties of a ball bearing, except size.

* * *

Thick deposits (0.001 in.) of cadmium, zinc, lead, silver, and copper can be applied to glass, metals, and plastics by vacuum evaporation through use of a tantalum-boat type of heating source, according to a report issued by Dept. of Commerce. To get copy of report, PB 131542, "An Engineering Study of Vacuum Metallizing," send $1.00 to Office of Technical Services, Dept. of Commerce, Washington 25.

* * *

Westinghouse Research Laboratories scientists developed a new detector that can respond to less than one-twentieth of a billionth of a watt of infrared (heat) radiation. The detector features a photoconductor made of germanium doped with gold, and it is this new material that gives the device its supersensitivity.

AVIATION MANUFACTURING

NEW SUB-HUNTER FLIES OVER THE PACIFIC

Prototype of Navy's newest sub-hunter, the Lockheed P3V-1, is shown in proving flight over the Pacific. P3V-1, a military version of the Lockheed prop-jet Electra transport, has a top speed of 460 mph. It is powered by Allison T56-10-W turbine engines rated at 4500 hp each. Tail stinger houses a magnetic anamoly detector unit, which seeks out submerged metallic objects. Navy has awarded Lockheed $10 million for pre-production work on the new patrol plane.

Army Demonstrates New "3-D" Radar Built by Hughes Aircraft

The Army unveiled a new "three-dimensional" radar, which it called "one of the most important advances made in electronic detection."

The new radar, which was developed by Hughes Aircraft Co., gives simultaneous readings of distance, bearing, and altitude, and is designed to be hauled on three truck trailers.

Dr. Nicholas A. Begovich, a Hughes scientist, explained that a means had long been sought to develop a radar that would scan space electronically, that is, without moving the antenna as in conventional radar. Such a frequency scanning system was originally developed by Hughes for the Navy for use on ships.

The antenna is the heart of the new system, Dr. Begovich said. Scanning is done electronically by varying the radar frequencies so that the emanating beam moves rapidly up and down.

In operation, the antenna is enveloped in a huge plastic balloon to protect it against wind, snow, and ice.

Frescanner is designed as an integral part of the Army's missile monitor system, the Army said. As part of this operation, the new radar would detect targets and transmit the locations to a computer for processing. The computer would then send the information necessary to fire such missiles as the Nike-Hercules, Nike-Ajax, or the Hawk to the appropriate weapons center.

North American Unveils X-15 Research Space Ship

The X-15 piloted space ship was rolled out of the North American Aviation hangar in Los Angeles, marking the beginning of the plane's flight test phase.

The hybrid research craft, half plane and half guided missile, is designed to fly at altitudes of 100 to 150 miles and speeds of 3600 mph.

The X-15 will test man's reaction to space flight, the effect of weightlessness, acceleration, and deceleration when leaving and re-entering the earth's atmosphere.

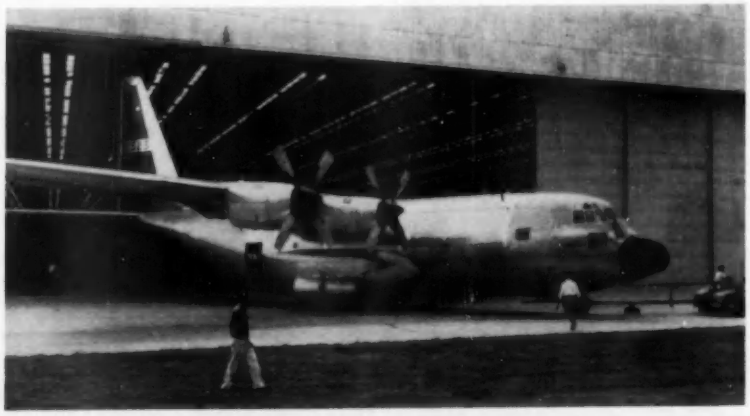
The X-15 is 50 ft long, 13 ft high, and has a wing span of 22 ft.

It is fabricated mostly from Inconel-X, titanium and stainless steel to withstand temperatures above 1000 F. Hydrogen peroxide is used in the ballistic controls system and as fuel for auxiliary power units.

The X-15 will be powered by a Reaction Motors Div. rocket engine, the XLR-99, of 50,000 lb thrust. Two XLR-11 rocket engines of less thrust will be used to power the plane on its initial test flights, which are scheduled for February 1959 at Edwards AFB.

Convair Develops Ballistic Cargo Missile for Army

A revolutionary "first" in military logistics—a system for delivering supplies by ballistic cargo missile—has been developed for the Army by Convair Div. of General Dynamics Corp.



NEW HERCULES TRANSPORT ROLLS OUT

The first of the new Hercules pro-jet transports is rolled out at Lockheed's Marietta, Ga., plant. The transport has a 4000-mile range and can attain a speed of 385 mph. It is powered by four T56-A-7 Allison GM prop-jets that develop a total of 16,200 eshp. It has a wing span of 132.6 ft. Fuselage is 97.7 ft long overall. Width is 14.2 ft. Deliveries to the Air Force are due to start in December.

PIPER TRI-PACER HAS NEW AUTO-PILOT

Piper Aircraft Corp. is offering its 1959 Tri-Pacer 160 in three models—the Standard, Super Custom, and AutoFlite. The 160 hp Lycoming engine—optional in 1958—will be standard on all three models. Featured on the AutoFlite is a transistorized, gyro-stabilized auto-pilot, weighing only 4½ lb. The four-passenger Tri-Pacer has a top speed of 141 mph, cruising speed of 134 mph, range of more than 500 miles, and rate-of-climb of better than 800 fpm. Fuel capacity is 36 gal.

Lawrence B. Richardson, senior vice-president, engineering, for General Dynamics, said the missile can deliver vital supplies to front-line troops wherever and whenever needed.

Richardson said the missile, known as Lobber, and its launcher can be carried by a team of three men in the field.

Quick-disconnect payload sections can be preloaded at the supply depots, Richardson said, and at least 70 per cent of every Lobber missile will be recoverable and can be re-used.

Although he did not disclose any of the design details, Richardson said the Lobber is simple to operate, impervious to weather, and low in cost.

Kaman Gets AF Contract For 54 H-43 Helicopters

Kaman Aircraft Co. has received a $10 million "follow-on" contract from the Air Force for 54 of its H-43B crash-rescue helicopters.

The company is now producing the turbine helicopters for the Air Force under a previous contract also amounting to $10 million.

The H-43B is powered by a Lycoming T-53 engine that develops 825 hp. It has two large counter-rotating main rotors and no tail rotor. Designed to find and bring help to downed aircraft, the H-43 is equipped with hoist, litter racks, and a special fire-fighting kit.

Kaman is soon to make deliveries on a new turbine helicopter for the Navy—the HU2K. Kaman is also licensee for the Fairey Rotodyne, the world's first VTOL transport.

Republic Develops Electronic Power Steering for F-105 Jet

An electronic power steering system that makes steering a jet plane as "easy as steering the family car" was announced by Republic Aviation.

The new assembly was designed by engineers of Republic Aviation and Bendix Aviation Corp. to fit into the nose wheel of the F-105 Thunderchief.

It consist primarily of two potentiometers, a transistorized amplifier, a servo mechanism, and a hydraulic unit and structural linkages. It works like this:

When the pilot nudges the rudder pedal, a signal is picked up by one potentiometer, amplified and fed to the servo that turns the wheel. The other potentiometer measures the change and relays the information back to the servo when it is time to "close the loop." The entire sequence takes place within thousandths of a second.

Republic engineers said that mechanical steering systems were too slow for high-speed landings and take-offs. A half-second delay in responding to the pilot's signal or a tiny amount of play in the steering arrangement of a supersonic jet could mean disaster.

The pilot can override the new system and steer manually at lower speeds to give him complete control of the jet on the ground at all times.

Aerojet and Bristol Form New Solid Rocket Motor Firm

Aerojet-General Corp. and the Bristol Aeroplane Co. Ltd., of England, have agreed to form a new joint company to produce solid rocket motors.

The new firm, to be known as Bristol-Aerojet, Ltd., will be located in England and develop and manufacture solid rocket motors and propellants.

Under terms of the agreement, Bristol-Aerojet will have exclusive rights to Aerojet solid rocket products in the United Kingdom and the British Commonwealth. Eventually, the agreement will be extended to include all of Western Europe.

Aerojet-General, a leading producer in this country of solid propellant rockets for missiles and aircraft, is contributing to the development of the Polaris and Minuteman.

Bristol is a leading producer of rocket motor cases for a wide range of British guided weapons, including the large Raven rockets used to power the Skylark, Britain's high-altitude research vehicle.

BEACHING VEHICLE

A beaching vehicle used by Navy P6M SeaMaster jet seaplanes to beach themselves is towed into water at Martin Co.'s Baltimore seadrome. When SeaMaster taxis into the vehicle, hydraulically operated pressure pads grip the plane's sides. Taxiing power is provided by the plane's four jet engines. Vehicle has flotation tanks and can be moored in the water when not in use.

MEN IN THE NEWS

Eaton Mfg. Co.—Gerald D. Griffin was promoted to eastern district sales manager of the Axle Div., and Ralph L. Jaeschke has been appointed chief engineer of the Dynamatic Div.

Simmonds Aerocessories Inc. — **Geoffrey R. Simmonds** was elected president and a director.

General Motors Corp.—**Walter K. Jensen** was named director of parts fabrication and **John A. Dobb** is now assistant director of New Devices Section.

New York Air Brake Co., Hydreco Div. — **Clare Engle** has been made superintendent of manufacturing and **George Diggles,** manager of production engineering.

Chrysler Corp. — **Philip N. Buckminster** has been elected managing director of Chrysler International, S. A.

Allis-Chalmers Mfg. Co. — **J. E. Watson, Jr.,** has been appointed manager of the New Orleans district.

Borg-Warner Corp. Marbon Chemical Div.—**D. M. Pratt** was appointed sales manager for resins and adhesives and **William A. Suiter** was named sales manager for Cycolac plastic.

Haynes Stellite Co.—Edward W. Connolly was appointed sales manager, eastern region, and John A. Gallaher sales manager, western region.

Thompson Products, Inc., Kolocast Industries Div.—Fred Dischinger was named plant manager of the Minerva, O., plant and Harold D. Blake succeeds him as chief engineer.

Joseph T. Ryerson & Son, Inc.—**John A. Houston** has been made assistant general manager of the Philadelphia steel service plant.

Ross & Co., Inc. — **Theodore L. Preble** was elected vice-president.

Youngstown Sheet & Tube Co.—**William E. Fowler** has retired as vice-president-traffic and purchasing.

Adalet Mfg. Co.—**Johan C. H. Larsen** was appointed vice-president in charge of sales.

Precision Rubber Products Corp.—**Robert Allen** and **William A. Smith** were elected president and vice-president, respectively.

Dodge Div., Chrysler Corp.—**B. L. Hengesbaugh** has been appointed supervisor-quality engineering.

American Bosch Arma Corp.—**Clifford A. Sharpe** was made senior vice-president.

Fairchild Engine and Airplane Corp., Guided Missiles Div.—**Hamilton O. Hauck** was appointed director of the Technical Dept.

White Motor Co., Truck Div. — **Harry D. Weller, Jr.** was made vice-president—sales.

Ford Motor Co.—**O. Fred Yando** has become New York district sales manager.

AC Spark Plug Div., General Motors Corp.—**Jack G. Briner** was named director of field service; **Joseph Holland,** special assistant to works manager; **S. Jack Demorest,** special assistant, beryllium gyros; **Alvin B. Goodspeed,** contracts manager.

Gulf Oil Corp.—**R. A. Hunter** was elected administrative vice-president, Marketing Dept.

Delco Products Div., General Motors Corp.—**William J. Wagner** has been named general sales manager and **Robert T. Collins,** director of material and production control.

Necrology

Russell M. Fellows, 66, chairman of the board of Fellows Gear Shaper Co., died Oct. 13, at Springfield, Vt.

Charles B. Spase, 65, chief engineer of automotive development at Lipe-Rollway Corp., died Oct. 9, at Syracuse, N. Y.

Charles C. Altum, Jr., 33, eastern hemisphere division sales manager for Willys-Overland Export Corp., died Oct. 9 while on a business trip to Paris.

Robert W. Nelson, 48, vice-president of American Air Filter Co., died Oct. 9, at Louisville, Ky.

V. A. Crosby, 64, manager of automotive development for Climax Molybdenum Co., a division of American Metal Climax, Inc., died Oct. 2, at Detroit, Mich.

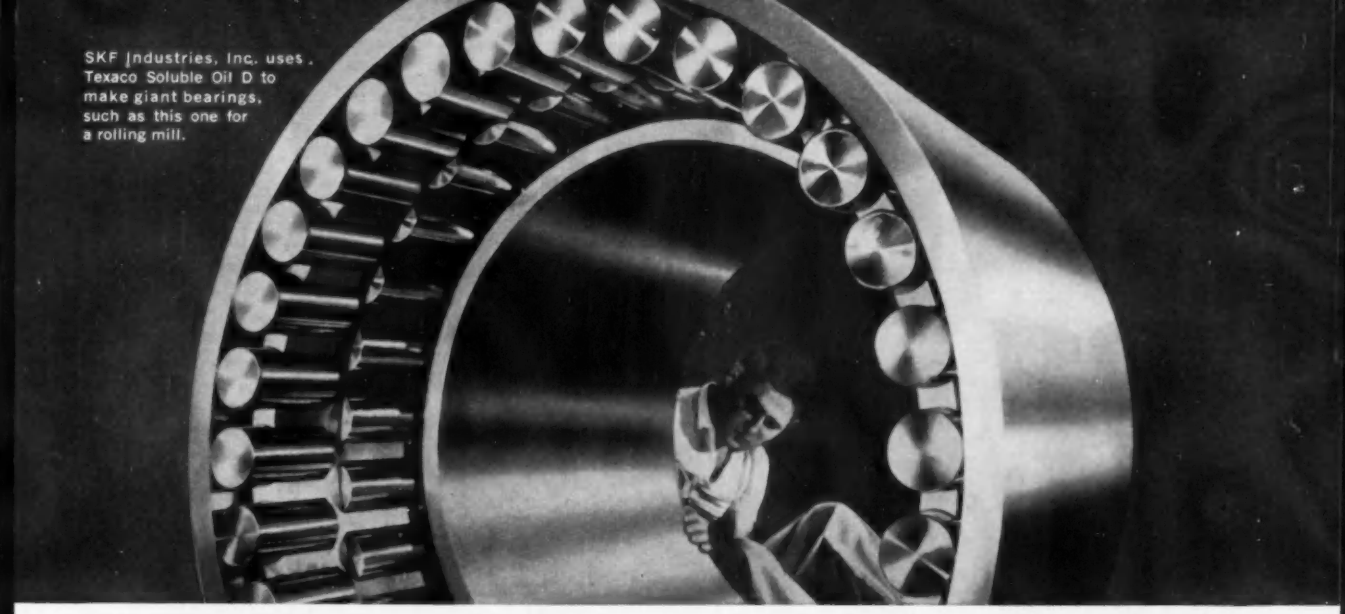
Lloyd F. Bayer, 64, senior vice-president of Tidewater Oil Co., died Sept. 29, at Oakland, Calif.

Brig. Gen. Elmer H. Salzman (USMC-retired), 56, director of administration for the aeronautical division of Minneapolis-Honeywell Regulator Co., died recently, at Minneapolis, Minn.

S. Clifford Merrill, 61, assistant general manager of the Automotive Div., Timken Roller Bearing Co., died recently, at Detroit, Mich.

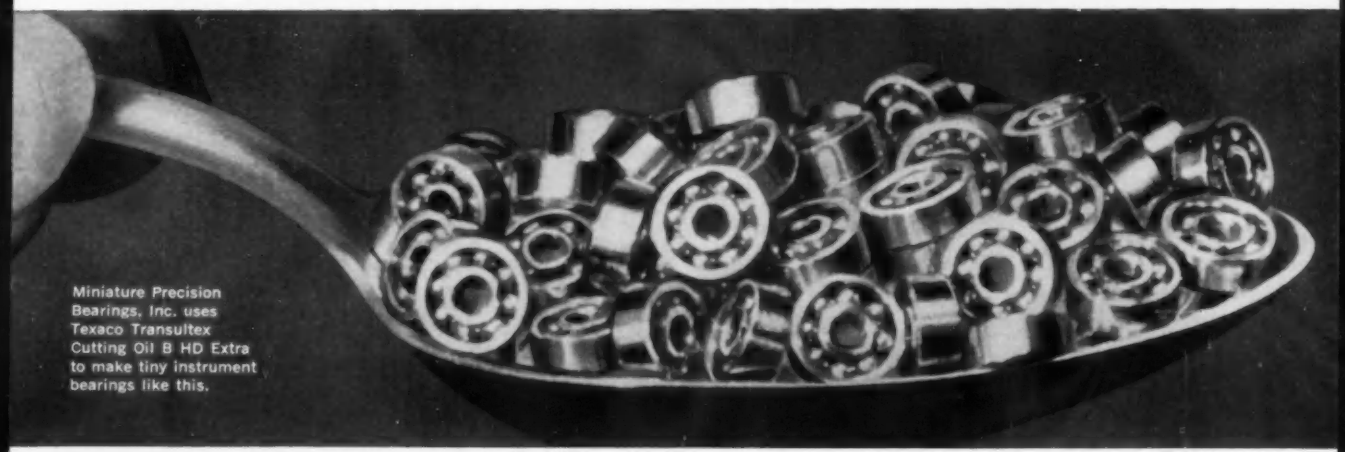
Frederick W. Allan, Sr., 80, founder of the Trojan Tractor business, died recently, at Batavia, N. Y.

Paul B. Pew, 60 executive vice-president of Linde Air Products Div. of Union Carbide Corp., died recently, at New York City.



SKF Industries, Inc. uses Texaco Soluble Oil D to make giant bearings, such as this one for a rolling mill.

WHAT SIZE IS YOUR MACHINING PROBLEM?



Miniature Precision Bearings, Inc. uses Texaco Transultex Cutting Oil B HD Extra to make tiny instrument bearings like this.

If you make anti-friction bearings of any size, you need grinding fluids that prevent rust and produce uniformly fine finishes. These fluids must also take into account the bearing material and the operating condition of your machines. They must have specific stability, cooling properties and ability to settle grinding dirt quickly. Otherwise your production drops and the number of rejects rises.

The makers of the small and large bearings shown above get fine bearing finishes and high production by using Texaco. There is a complete line of Texaco Cutting, Grinding and Soluble Oils to help improve machining on every job.

Take this tip. Use Texaco Cutting, Grinding and Soluble Oils—they'll help you produce faster, better and at lower cost, whether your product is the largest or the smallest.

Let a Texaco Lubrication Engineer suggest the best ones for your jobs. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

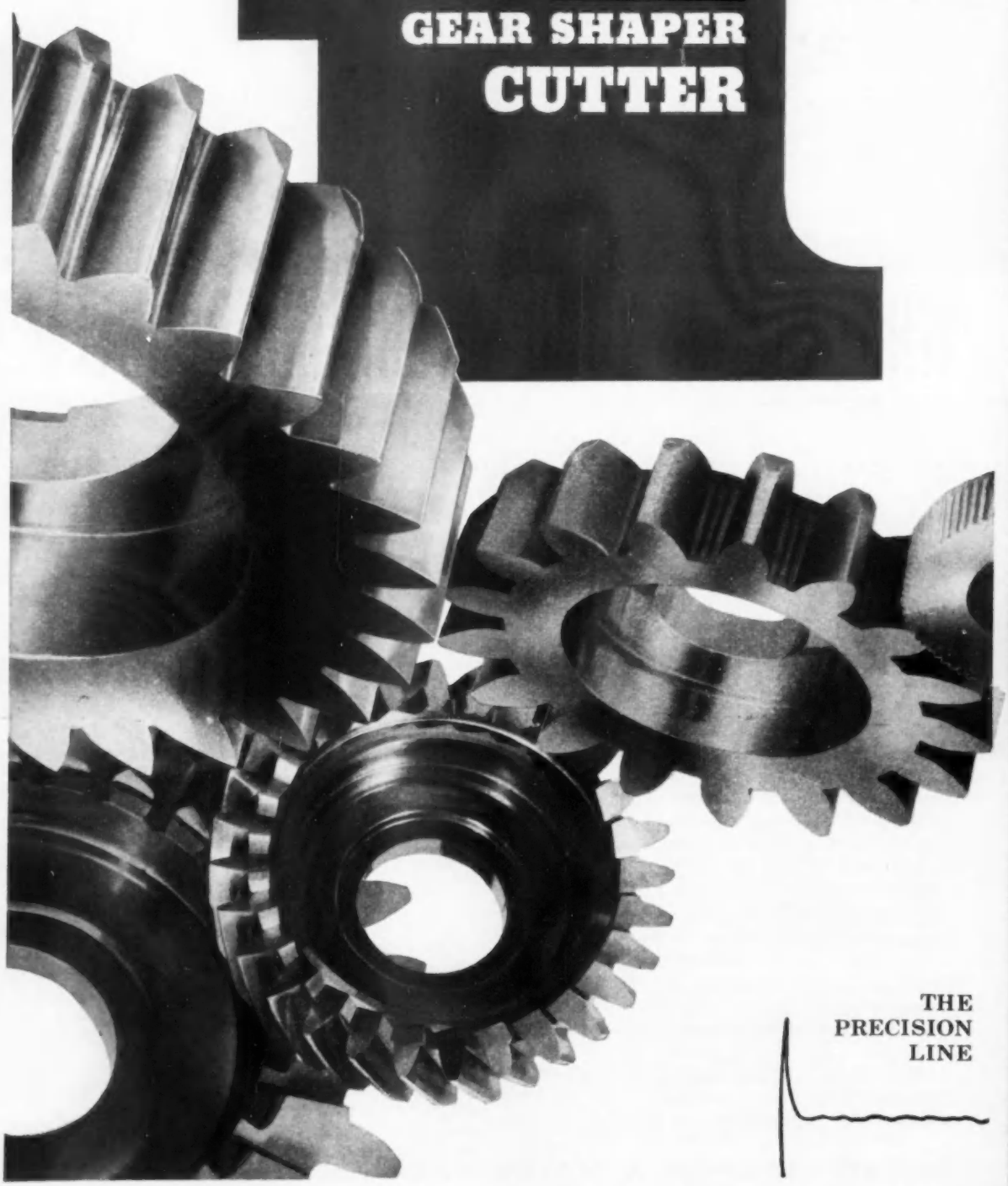
LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)

Circle 276 on Inquiry Card for more data

1 FELLOWS MADE THE FIRST GEAR SHAPER CUTTER

. . . and



THE PRECISION LINE

FELLOWS
still makes the BEST

The Fellows Cutters you order today have unequalled experience behind their manufacture: the first gear shaper cutter ever made was designed, produced and patented by Fellows in 1897. Hundreds of thousands of Fellows Cutters have been made and used on gear production lines since that time.

This vast experience has resulted in constant progress, year after year, in cutter design and manufacture. Today, new gear and cutter designs are checked on a high-speed electronic computer which permits complete mathematical study of all possibilities. Constant advances in metallurgy and in manufacturing methods assure outstanding cutter performance on every gear production job.

A booklet, "Fellows Gear Shaper Cutters", covers the subject in detail. It includes tables of stock cutters, design considerations, sharpening methods, and other information. For a copy, contact any Fellows office.

THE FELLOWS GEAR SHAPER COMPANY
78 River Street, Springfield, Vermont
Branch Offices: 1048 North Woodward Avenue, Royal Oak, Mich.
150 West Pleasant Avenue, Maywood, N. J.
5835 West North Avenue, Chicago 39
6214 West Manchester Avenue, Los Angeles 45

Fellows *Gear Production Equipment*

Circle 277 on Inquiry Card for more data

Studebaker's 1959 Lark Deluxe two-door sedan is powered by a six-cylinder 169.6-cu-in. L-head engine designed for maxium economy of operation

Studebaker-Packard Unveils All New Lark and 1959 Silver Hawk

STUDEBAKER-PACKARD'S answer to the current motor car market is its new small car—the Lark—which will be offered in three body models with either a Six or V-8 engine. In addition, the company has simplified its line by launching only one model in a larger package—the Silver Hawk—which is available only in a sport coupe and comes equipped either with a Six or V-8 engine.

Sedan and hardtop models of the Lark are mounted on a wheelbase of 108½ in.; with an overall length of only 175 in., more than two feet shorter than previous S-P cars. Station wagons in this series are on a wheelbase of 113 in., with overall length of 184½ in. Overall width of all Lark models is 69.0 in.

Although smaller than last year's cars, the Larks have the same shoulder width and hip room. The turning radius has, of course, been materially reduced.

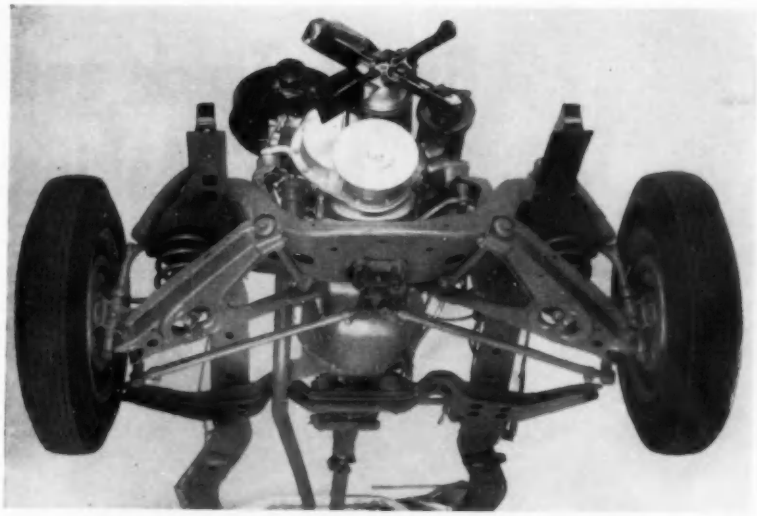
On the Silver Hawk, wheelbase is 120.5 in., overall length is 204.0 in., and overall width 71.3 in.

The L-head Six has been changed to a shorter stroke, 4-in. as compared with 4⅜-in. last year, with a consequent displacement of 169.6 cu in. It has an improved combustion chamber configuration, and compression ratio stepped up from the former 7.8 to 8.3 to 1.

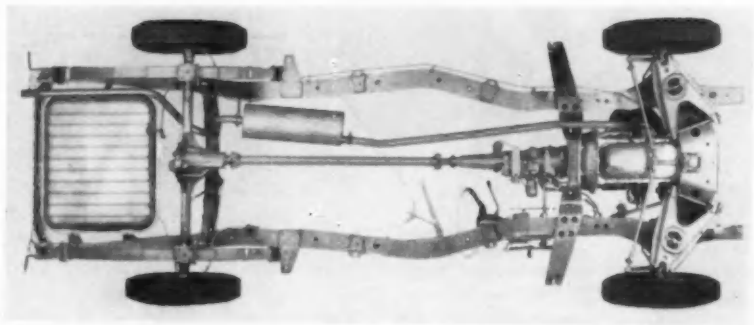
While reducing the stroke, the engine has been fitted with a stiffer and more rigid crankshaft with increased bearing overlap. In addition, the pistons have ben redesigned to provide greater strength, longer ring life. Other new features include: a new carburetor with automatic choke and a hat-type air claener. On the new carburetor, throat size has been reduced, jets calibrated for maximum economy, and power enrichment controls improved.

The V-8 remains the same 259.2-cu-in. engine used on Commander models last year, but compression ratio has been boosted from 8.3

The Silver Hawk sport coupe is offered on a 120.5-in. wheelbase, with either the new six-cylinder or the V-8 engine. Parking lights have been lowered from atop the fenders to the bumper. A new chrome line accents the fins.



Closeup of Lark six-cylinder front suspension and steering linkage



Underneath overall view of Lark six-cylinder chassis

1959 STUDEBAKER LARK AND SILVER HAWK

Body Models and Engine Options

	Lark Deluxe 2-dr. Sedan Lark Deluxe 4-dr. Sedan Lark Deluxe 2-dr. S. W.	Lark Regal 4-dr. Sedan Lark Regal 2-dr. Hardtop Lark Regal 2-dr. S. W. Silver Hawk	
Engine Type	L-head 6	L-head 6	OHV V-8
Bore (in.)	3.0	3.0	3.56
Stroke (in.)	4.0	4.0	3.25
Displacement (cu in.)	169.6	169.6	259.2
Compression Ratio	8.3	8.3	8.8
Bhp (max.)	90 @ 4000 rpm	90 @ 4000 rpm	180 @ 4500 rpm
Torque (lb-ft, max.)	145 @ 2000 rpm	145 @ 2000 rpm	260 @ 2800 rpm
Carburetor	1-bbl	1-bbl	2-bbl*
Carburetor	1-bbl	1-bbl	2-bbl*

* Power kit with 4-bbl carburetor and dual exhaust, increasing Bhp to 195 @ 4500 rpm and torque to 265 lb-ft at 3000 rpm, available as optional equipment.

to 8.8 to 1. A more efficient two-barrel carburetor is standard equipment, and this, together with a new intake manifold, provides better overall performance and economy. An optional four-barrel carburetor, with dual exhaust system, is available for those desiring greater performance. All engines are tailored to operate on regular gasolines.

A new, variable-ratio steering gear is supplied on six-cylinder models. It offers faster steering response, requires fewer wheel turns. In addition, steering effort has been reduced and steering wheel recovery improved.

Exceptional riding qualities are claimed as a result of improvements in the variable rate front coil springs. New shock absorber valving and redesigned rear leaf springs also contribute to ride improvement. Added to this is increased stability with reduced body roll, resulting from a wider tread as well as the improvements in the suspension system.

A redesigned ladder-type frame provides greater torsional and beam strength. This, coupled with stronger body construction, provides for increased overall rigidity and improved quietness.

One of the body design features, unique to S-P, is the provision of removable fender panels, this contributing to lower replacement costs in the event of collision damage.

All 1959 models can be equipped with conventional synchromesh, overdrive combination, or the Flightomatic transmission. The Twin-Traction, non-slip differential is available on all models as an option; as are power brakes and air conditioning. Power steering is optional only on V-8 models. In addition, the Hill-Holder is available as an option on all models, except when equipped with Flightomatic drive.

Among other details is an inside-the-car hood latch to prevent tampering with the engine. The windshield is deeper and larger in area.

An improved under-dash Climatizer unit gives better heat distribution and faster defrosting. The quieter, increased - output heater motor now is located inside the passenger compartment for protection against the elements. The front seat has also been redesigned to permit heat to flow unobstructed under the seat to the rear.

Optional reclining front seats are available. Each divided front seat back can be adjusted to seven positions, including "bed" position level with the rear seat cushion.

Offered as an option on the station wagon is a Hideaway third seat, increasing passenger carrying capacity to eight. When not in use the seat folds down in the floor. ■

British Truck and Now Making

Atkinson heavy truck chassis is claimed to be the only eight-wheeler with a fluid clutch and semi-automatic transmission.

LONDON, ENGLAND

THE biennial Commercial Motor Show in September was held at a time when the British truck and bus industry is staging a commercial comeback, as well as making rapid technical advances. Production and exports slumped during the past two years as a result of the Suez crisis, fuel rationing, shipping difficulties, and the severe credit squeeze. Now production is climbing back towards the 1955 peak, with current output running at an anual rate of 300,000 vehicles

While domestic sales are on the increase, anticipated exports of 122,000 units remain at approximately the 1956-57 level, although losses in major markets such as Argentina, Holland, India and West Africa have been offset by gains in South Africa, Australia, New Zealand, Canada and America.

Design trends in the commercial sector of the industry indicate that from the technical standpoint it is considerably more advanced and enterprising than most car manufacturers. Disk brakes, air suspension, automatic transmissions and power steering are now increasingly found on the heavier vehicles.

Cab designs are also getting more attention, following the need of fleet operators to find and keep good drivers. Many of the latest truck models have forward-control cabs and feature improved visibility and seats, heating and cooling facilities, and interior styling, in addition to refinements like radios, cigar lighters and electric razor sockets.

Engine Trends

Diesel engines are becoming almost universal on all but the lighter vehicles derived from car chassis components. Outputs are being raised, and turbochargers are gaining in favor. This move towards higher power is one of the clear lines of development of British commercial vehicles. It stems from the prospect of the express highways now under construction in the U. K., and from the growing overseas demand for highspeed trucks with a large payload capacity, suitable for economic long-distance transport.

As a result of this tendency, more of the large manufacturers with mass-production facilities are increasing the power and load rating of their vehicles, thereby stiffening the competition for the many specialized producers in the heavy-duty field. A parallel trend, also favoring the big firms, is towards the purchase by operators of low-cost models with a relatively short but hard-driven life, which can be economically written off and replaced in a few years.

Yet it is the small-quantity manufacturers who are responsible for most of the technical innovations, and who have the advantage of being able to introduce advanced designs rapidly, and without the costly retooling involved in large-scale production.

These latest developments were reflected at Earls Court in London,

Bus Industry Determined Comeback

By David Scott
Special European Correspondent
for AUTOMOTIVE INDUSTRIES

With Production Climbing, London Show Reflects Improving Conditions. New Models and Numerous Technical Advances Offered by Many Companies. Increasing Use of Diesels, Disk Brakes, Air Suspension, Automatic Transmissions and Power Steering on Heavier Vehicles

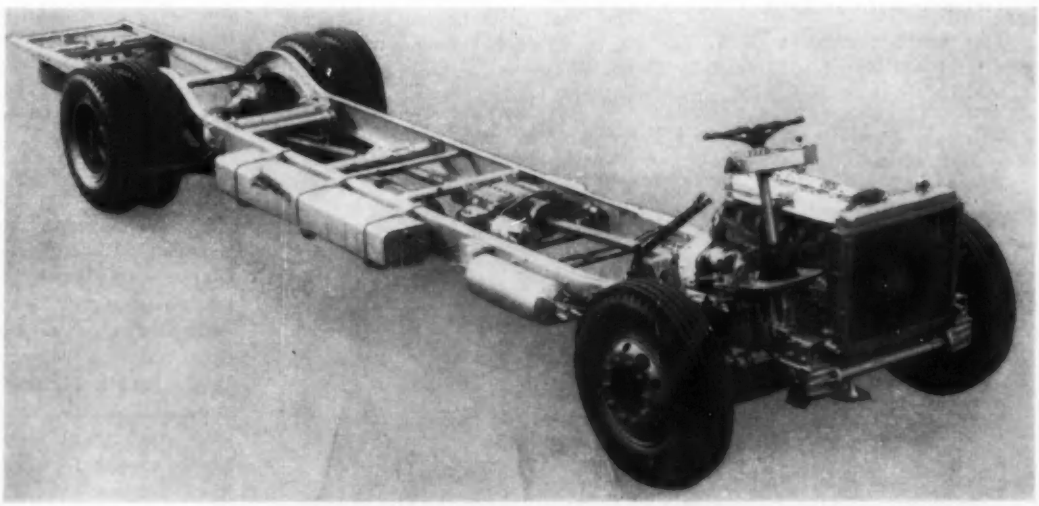
where nearly 100 completely new or modified British vehicles were on show. Thirty-one U. K. makes of trucks and buses were displayed, together with one from America (Willys Jeep) and two each from Germany and Czechoslovakia. A record total of 454 exhibitors took part, occupying 277,500 sq ft to make this the largest commercial show yet held in Britain.

One of the outstanding new exhibits was a prototype coach chassis, unveiled by Guy Motors, featuring air suspension and disk brakes on all wheels, and a mid-mounted underfloor engine driving through an automatic transmission. The chassis was specifically designed for air suspension, and front wheels are individually sprung on Firestone Airide rolling diaphragm units.

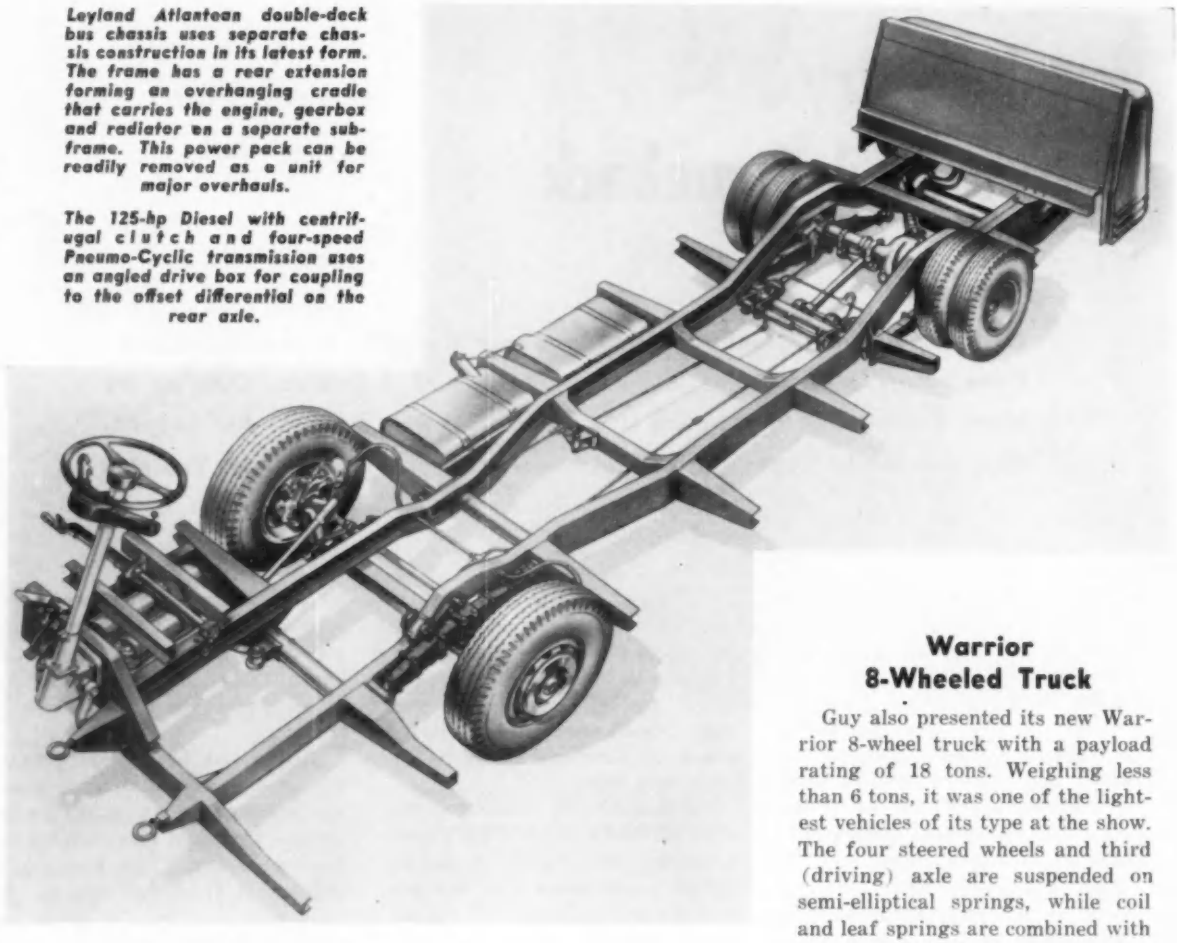
Wheel loading is transmitted directly to widely spaced diaphragms mounted on the king pin standards, and each suspension assembly can be individually detatched. Beams carried by twin air springs supported the solid rear axle, located by two transverse Panhard rods with torque reaction absorbed by upper and lower pairs of parallel links. There are three levelling valves, one at the rear and two in front.

Girling disk brakes, self-adjusting on the hydrastatic principle, are actuated by an air-hydraulic system, front and rear circuits being independent. These have single calipers in front and two at the rear, with facilities for quick removal of friction pads.

The engine is a horizontal 677-



Daimler single-deck bus chassis intended for overseas use has a forward 150-hp Diesel driving through an automatic transmission mid-mounted under the floor.



Leyland Atlantean double-deck bus chassis uses separate chassis construction in its latest form. The frame has a rear extension forming an overhanging cradle that carries the engine, gearbox and radiator on a separate subframe. This power pack can be readily removed as a unit for major overhauls.

The 125-hp Diesel with centrifugal clutch and four-speed Pneumo-Cyclic transmission uses an angled drive box for coupling to the offset differential on the rear axle.

cu in. 150-hp Leyland Diesel coupled through a fluid clutch to a five-speed epicyclic gearbox developed by Guy.

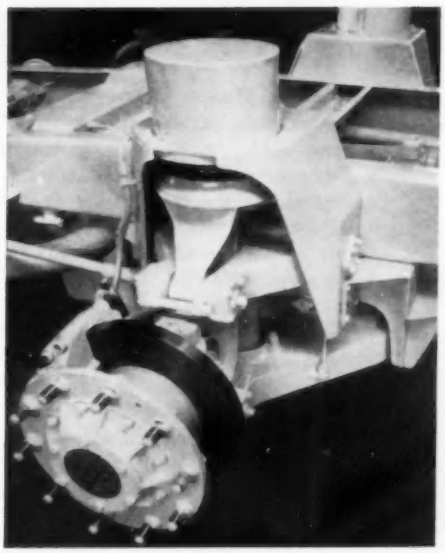
This gearbox employs C. A. V. electrical equipment to give fully automatic control, but with provision for manual override. Transmission ratios include a direct fourth gear and overdrive top, and the final drive is an underslung worm. The flat frame with 18-ft wheelbase is suitable for semi-integral bodies.

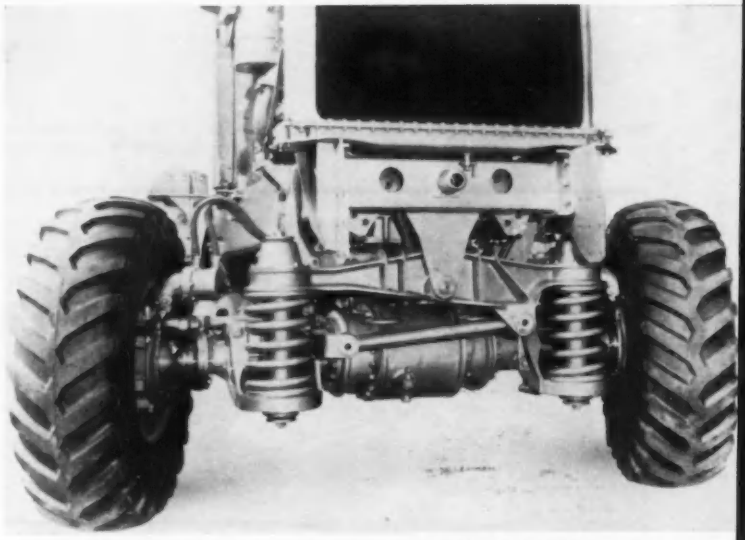
Eight-wheeled Guy Invincible has a gross laden weight of 40 tons.

Warrior 8-Wheeled Truck

Guy also presented its new Warrior 8-wheel truck with a payload rating of 18 tons. Weighing less than 6 tons, it was one of the lightest vehicles of its type at the show. The four steered wheels and third (driving) axle are suspended on semi-elliptical springs, while coil and leaf springs are combined with a hydraulic load compensator for the fourth trailing axle. The 112-hp Diesel drives through a five-speed synchromesh gearbox and Eaton two-speed axle. The forward-control cab with twin headlights leaves a maximum cargo area within the 30-ft overall length of the vehicle.

Another Guy development was the Arab 30- by 8-ft two-deck bus seating 68 passengers and with a front entry platform. The forward-engined chassis is powered by a Gardner 112-hp Diesel, and the four-speed automatic transmission is similar to that used on the air suspension chassis. Also shown by Guy was its recently-introduced Invincible Mk. II heavy trucks produced as 4-, 6-, and 8-wheelers with gross weights up to 40 tons. These have a forward-control cab like that on the Warrior, with special attention paid to driver comfort.





Front-drive axle of the Scammell Super Constructor is suspended by coil springs and a rocking beam to eliminate frame distortion and give even wheel loading. Sideways location is by Panhard rod, fore-and-aft by torque arms ball-jointed to the chassis. Drive from the 230-hp Leyland Diesel is through a fluid coupling and eight-speed epicyclic transmission.

Above—

Detail view of the independent front suspension on the Guy prototype coach chassis. The air-sprung assembly with disk braking can be detached as a unit.

Chassis Frame on Leyland Bus

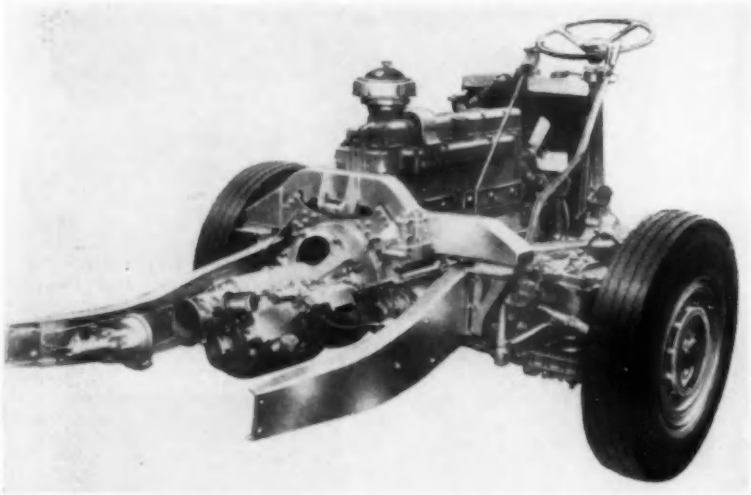
Leyland has reverted from integral to separate chassis-frame construction in the latest version of its Atlantean double-decker bus, since this design widens the choice of bodies to be fitted by an operator. The frame has a rear extension forming an overhanging cradle that carries the engine, gearbox and radiator on a separate sub-frame. This power pack can be readily removed as a unit for major overhauls.

The 125-hp Diesel with centrifugal clutch and four-speed Pneumo-Cyclic transmission uses an angled drive box for coupling to the off-set differential on the rear axle. Helical gears can be easily changed to provide the desired ratio—a simpler procedure than the usual method of altering the crown and pinion to suit individual requirements. They also provide a major portion of the final reduction, permitting the use of a large pinion with light tooth loading.

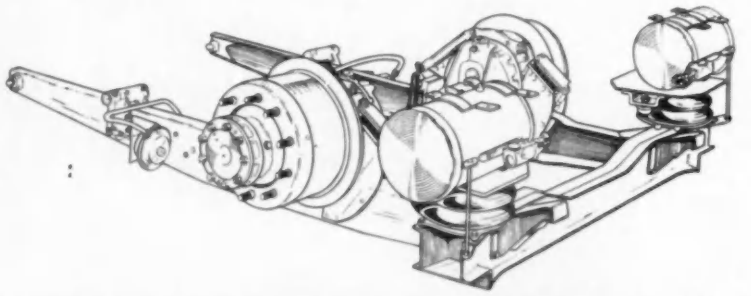
A further Leyland innovation at the show was a new range of Super Comet 9-ton trucks, derived from and superseding the lighter Comet. These two-axel chassis employ an enlarged version of the company's existing six-cylinder Diesel, which now has a capacity of 377 cu in. and develops 110 hp at a governed 2400 rpm. An overdrive sixth ratio can be incorporated in the standard 5-speed gearbox, and a two-speed or hub-reduction axle are available. Following the current trend is the forward-control cab offering such amenities as a curved one-piece windshield, high-volume heater and built-in radio.

Comparable to this model in design and load capacity is the Clydesdale 9-ton chassis made by Albion, a member of the Leyland group. Employing the same basic engine and transmission system it is produced in five wheelbases and as a tractor.

Also allied with Leyland is Scammell, which presented its 6 x 6 Super Constructor with a gross weight rating of 150 tons with a drawbar trailer, and intended for oilfield use. Developed from existing heavy-duty chassis, it is distinguished by an improved front suspension employing a rocking axle supported by coil springs and telescopic shock absorbers at each end of a centrally-pivoted beam. The axle is transversely located by a Panhard rod, and laterally by torque arms ball-jointed to the chassis. Higher power is provided by a Leyland 926-cu in. Diesel with a rating of 230 hp at 1900 rpm, and the transmission com-



Wheelbarrow front-end frame assembly of the A.E.C. Bridgemaster combines the power plant and independent coil suspension in a detachable unit.



Rear suspension of the A.E.C. Bridgemaster double-decker bus employs a rubber-bushed trailing arm assembly sprung by twin bellows with surge tanks above.

prises a fluid clutch and semi-automatic 8-speed epicyclic gearbox.

Air Suspension on A.E.C. Buses

Air suspension was a highlight of the A.E.C. exhibit, where the Reliance underfloor-engined bus chassis was displayed with Dunlop three-convolution 12-in. bellows at each wheel. Fore and aft layouts are similar, with the front bellows placed between the axle and frame, and the rear ones fitted immediately behind the axle casing. The front beam axle is located by forward-facing radius arms, while trailing arms with rubber-sandwich attachment points are used at the rear.

Air springs at the rear are now standard equipment on the double-deck Bridgemaster bus, which was shown as a prototype at the Scottish Motor Show a year ago. The drive axle is supported by two channel-section radius arms pivoting at the front on rubber bushes, and joined at the rear by a transverse I-section beam on whose extremities are mounted the bellows with surge tanks above. Independent suspension with coil springs is used in front, and these assemblies are combined with the engine and gearbox on a detachable chassis section that can be withdrawn as a unit for maintenance when needed.

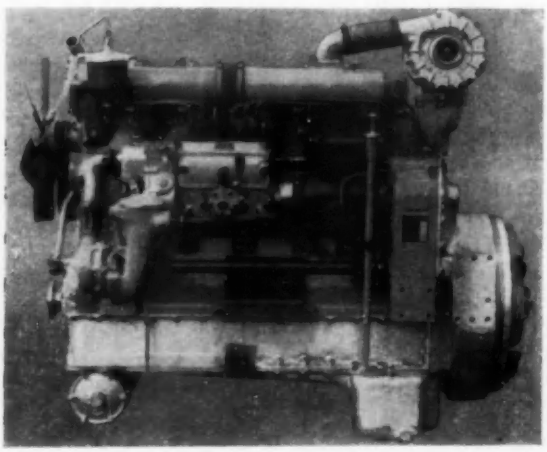
A last-minute addition to this display was an air-sprung prototype Mercury Mk. II 14-ton (gross) truck presented by Maudslay, another member of the A.C.V. group. Applied to both axles, the system appeared to be a close adaptation of that seen on the Reliance bus.

New Diesels

Another improved A.E.C. truck was the Mammoth Major eight-wheeler with a redesigned 4-spring rear suspension, the two-axle bogie being suspended by under-slung semi-elliptics. Engine for this 24-ton gross weight model is a new 690-cu in. six-cylinder Diesel which replaces an earlier unit of the same dimensions as part of the group's rationalization policy.

Rated at 150 hp at 1800 rpm, it uses a toroidal combustion system,

DAIMLER CD. 6 524-CU IN. DIESEL

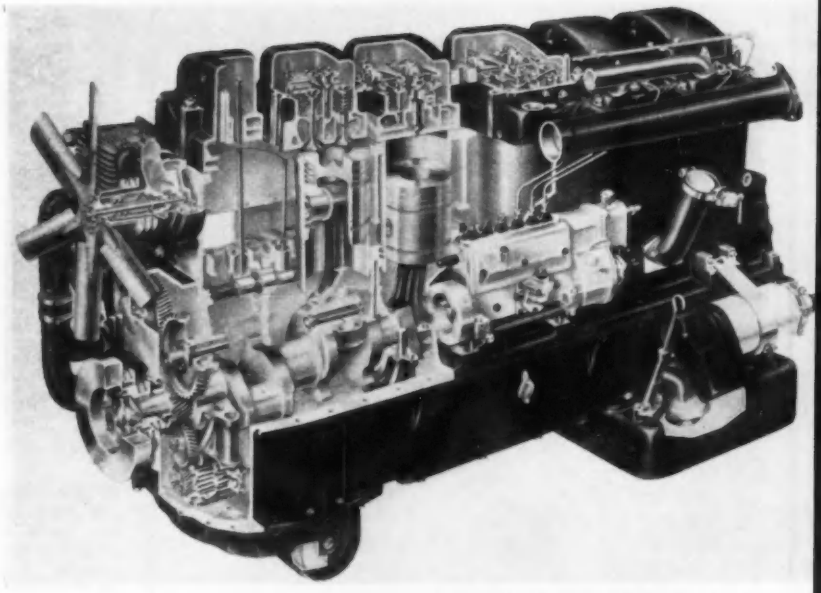


Supercharged Daimler CD-6 Diesel of 524-cu in. displacement puts out 148 hp at 2000 rpm. The B.S.A. blower is mounted at the rear of the twin-duct tuned manifolds.

push-fit wet cylinder liners, and renewable valve-seat inserts. A similar 125-hp unit of 590-cu in. capacity has also been introduced. Another new engine is a 1083-cu in. six cylinder Diesel produced in both horizontal and vertical forms and developing 275 hp at 1900 rpm. It employs individual cylinder heads with four valves each, and a separate oil pump to circulate oil through a heat exchanger embodied in the cooling water circuit.

The Mammoth Major 6 with the above 150-hp engine forms the basis for the six-wheeled Dumptruck that A.E.C. presented at the show. This has a 10-cu yd body tipped to 70 degrees by a hydraulic ram driven by a swashplate pump. The five-speed gearbox is specially designed for dump work, and incorporates extra-heavy 1st, 2nd and reverse gear training suitable for continuous operation.

One of the largest vehicles at Earls Court was the Thornycroft Antar three-axle chassis intended for oilfield use. This 33-ton load carrier is powered by a 689-cu in. turbocharged Diesel having a gross output of 200 hp at 1900 rpm. Drive is through a four-speed gearbox, and a separate three-speed auxiliary box with its own reverse gear and a pto capable of handling an 80,000-lb winch. Front axle drive is pneumatically engaged, and the double-reduction rear axles use overhead worm and epicyclic gearing.



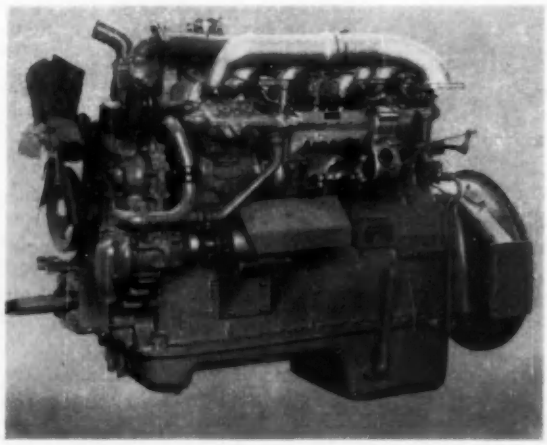
A.E.C. 1083-cu in. six-cylinder Diesel has a rating of 275 hp at 1900 rpm. The individual cylinder heads have four valves each.

Thornycroft also introduced the Mastiff truck, designed to meet the latest British regulations permitting two-axle vehicles to operate at a maximum gross laden weight of 14 tons. Of cab-over-engine construction, it uses a new 480-cu in. direct-injection Diesel putting out 109 hp at 1800 rpm. This is integral with the five-speed bearbox having overdrive as an optional top ratio.

Daimler offered a supercharged version of its CD.6 six-cylinder Diesel that was designed before the war and first produced in 1945. Fitted with a B. S. A. blower mounted on the rear of a twin-duct exhaust manifold tuned to utilize pulse energy, the 524-cu in. four-stroke engine has a maximum output of 148 hp at 2000 rpm, and a torque of 440 lb/ft at 1250.

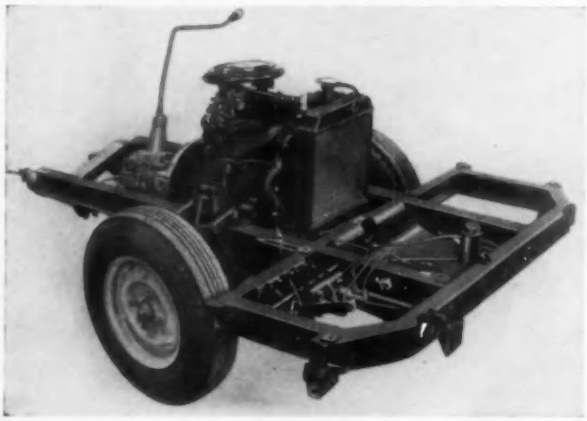
Also new from Daimler is a single-deck bus chassis intended for overseas operation in view of its ease of maintenance, suitability for different types of bodies, and large seating capacity. A 150-hp Diesel is conventionally mounted on

A.E.C. Dumptruk with 10-cu yd body has heavy-duty 1st, 2nd and reverse gears designed for continuous operation. The body can be tipped to 70 deg by hydraulic ram.



THORNYCROFT 480-CU IN. DIESEL

Thornycroft 480-cu in. Diesel, developing 109 hp at 1800 rpm, powers the new Mastiff 14-ton two-axle truck. The engine is integral with the five-speed gearbox.



At left, Standard Atlas half-ton truck has 37-hp engine, gearbox and front suspension assemblies carried on a detachable frame section that can be readily withdrawn for servicing. Narrow front tread (3 ft 9 in. against 4 ft 4¼ in. at the rear) gives a 29-ft turning circle with a 7-ft wheelbase.

Bedford 6-ton dumper, produced by Vauxhall (GM), is offered with a 214- or 300-cu in. gas engine, or 300-cu in. Diesel. A two-speed axle is optional.

the 22-ft wheelbase channel frame, and a Diamatic transmission (A. I., 1 December 1957) is standard equipment.

E.R.F. was the first British manufacturer to put disk brakes on a truck, installing them on the front wheels of its 54G 7-cu yd dumper. The 15½-in. Girling units with twin pads in a single caliper are hydraulically operated with air assistance, air being bled off from the servo to actuate the normal drum brakes at the rear. Power unit is a 94-hp Gardner Diesel driving through a five-speed gearbox and double-reduction axle.

Semi-forward control is used on the new E.R.F. 66 GSF six-wheeled tractor powered by a 150-hp Gardner coupled to the double-drive rear bogie through an overdrive gearbox with ten forward speeds, and overhead worm axles. Gross train rating of this vehicle is 40 tons.

Experimental Tractor with Disk Brakes and Air Suspension

Highlight of the Fodens exhibit was the experimental heavy-duty tractor with both disk brakes and air springing. Combined leaf and air springing is used on the front axle, where each conventionally-placed semi-elliptic has a static rating of only one ton. The Dunlop Pneuride 9¼-in. bellows is placed between the center of the leaf spring and the frame, and takes the major part of the load, frequency characteristics of the two units being matched.

Channel-section trailing arms support the rear axle with two 12-in. bellows on each side. Front wheels are braked by Dunlop twin-caliper disks, while two twin-caliper assemblies are used at the rear. The transmission hand brake is also a disk.

Foden Lightweight 8-Wheeler

Specialists in the heaviest vehicles, Fodens also unveiled a new ultra-light eight-wheeler with a chassis weight of only 5½ tons but a payload rating of 17¾ tons. Weight is saved by using ¼-in. frame pressings, alloy platform body, and plastic forward-control cab. A high power-weight ratio is obtained with the uprated Foden FD6 Mk. III engine—a two-stroke six-cylinder Diesel of 250 cu in. displacement that develops 150 hp at 2400 rpm. It is scavenged by a Roots-type blower feeding air into a common chest which is released through ports in the cylinder walls and exhausted through overhead valves.

Seddon has entered the eight-wheeler field with a 20-ton (gross) vehicle having a Gardner 150-hp Diesel, double-drive bogie, power-assisted steering, and all-wheel air brakes. A Cummins engine is available as an optional power unit.

Dennis displayed a modified Loline two-deck bus in which the overall height of the 70-seat body

Land Rover fire engine features a 500-gpm pump driven by a 60-hp gas turbine.

is reduced to 13 ft 7 in. by means of a redesigned frame. It also presented a new approach to delivery vans with the 3-ton Paravan that features an up-and-over door angled at the front curb-side corner of the body, and a 55-hp Perkins Diesel mounted behind the driver's seat so as to give easy access to the 600-cu ft cargo area.

Another strong contender in the heavy freighter field is Atkinson, which showed a new eight-wheeler claimed to be the first vehicle of its type with a fluid clutch and semi-automatic transmission. This twin-steering 24-tonner (gross) uses a 112-hp Gardner Diesel with a five-speed epicyclic gearbox made by Self-Changing Gears. It also features a plastic-panelled forward-control cab with two-piece wrapped windshield.

Vauxhall and Ford Truck Lines

The trend of the larger car manufacturers to push more deeply into the commercial transport field is typified by Vauxhall (GM) which introduced a new line of

(*Turn to page* 82, *please*)

General Motors Views on the Small Car

By JOHN F. GORDON
PRESIDENT, GENERAL MOTORS CORP.

GENERAL MOTORS *is* building small cars and has been for more than 30 years—in our plants abroad. Currently, we are distributing about 3600 of our foreign-built cars a month in the American market.

What about an American-built smaller car? Well, that's a good question.

The smaller car is a perennial subject of discussion with us. In fact, I can hardly remember the time when we did not have plans for a smaller car in some stage of preparation.

Back in 1939 there was a flare-up of interest in a so-called lighter car, but it soon died down.

Light Car Project of 1945

Then, in 1945—on May 15 to be exact—we actually announced plans to produce such a car in the postwar period. A substantial appropriation was voted, land was purchased for two plants, steel was ordered for the buildings and tools and dies for the car itself. We organized and staffed a light car division and had a number of prototype cars in operation at our Proving Ground.

For the next two years we were continuously weighing the pros and cons of such a subject. Eventually, the cons won out. In September of 1946 we decided to suspend construction activities relating to the light car because of steel and other shortages, and the following May we announced that we had definitely put the project on the back burner.

The nucleus of the engineering staff of the light car division was continued as a project study group. One piece of land was sold (interestingly enough, one of our competitors now has a plant on it), and the structural steel for the building shipped to Vauxhall and the Frigidaire operation of General Motors Limited in England. The other plant was completed and is now turning out Chevrolet Powerglide transmissions.

I would say that the wisdom of our decision in 1947 was later substantiated by the experience of several other companies with American-built small cars.

Point of No Return

The reason I have delved into history in some detail is because I think it illustrates the point that in our business we must be tremendously flexible at all times. We try to keep the point of no return as far ahead as possible by always having alternate uses to which facilities and organization can be put.

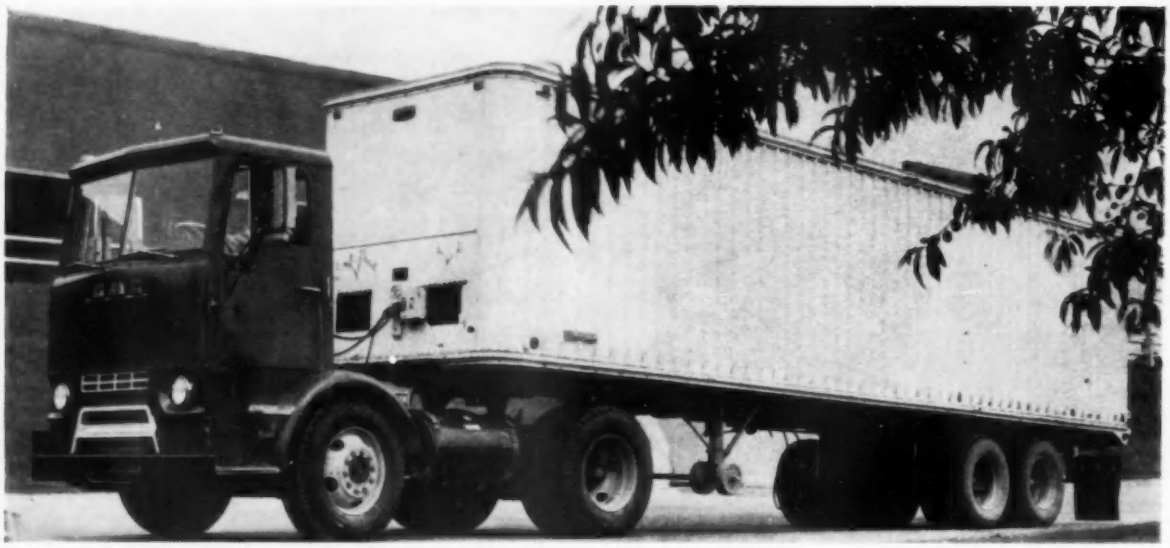
Last May we told our shareholders that the question of building a smaller car in the United States was under study. Since then we have advanced perhaps midway between May of 1945 and May of 1947. We are moving forward but are still weighing the pros and cons. We are taking a hard look at the whole small car idea—at the European imports, at why people buy them, at costs, at all of the factors involved.

Final Decision for Future

You would like me to tell you which way the cat is going to jump—or even when. It is impossible to say, as yet.

All I can say is that we have not yet reached the point of no return—and that our objective always has been, is and will continue to be to give the American consumer the kind of individualized transportation that he demonstrates he wants.

The foregoing is from the remarks of Mr. Gordon last month at the news conference preliminary to GM Motorama of 1959 in New York City. ■



New GMC highway tractor model DLR-8000 features aluminum tilt cab, independent front wheel suspension, air ride, and fabricated chassis frame

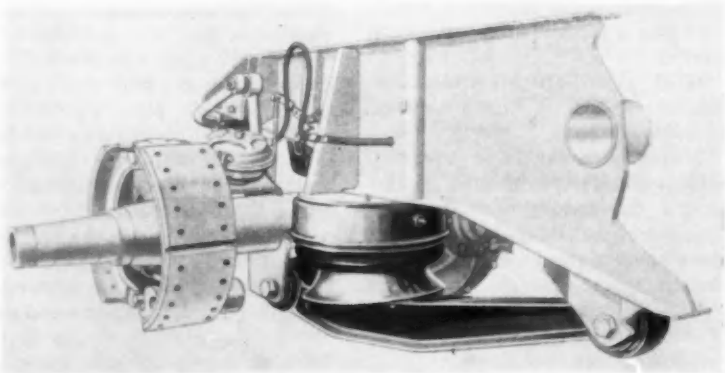
GMC HIGHWAY TRACTORS Stress Weight-Saving Designs

SOMETHING decidedly new in heavy-duty highway tractors is offered by the GMC Truck & Coach Division, in launching two new tractors. They are the forerunners of a large-scale engineering program now under way. Model DLR-8000, with the front axle set back 50-in., is rated 60,000-lb GCW; while the DFR-8000, with a 28-in. front axle placement, will handle loads up to 76,000-lb GCW.

These tractors, now undergoing their final road testing before production, embody some noteworthy engineering features. They have air suspension all around as standard equipment, together with independent front wheel suspension —something quite distinctive for heavy-duty vehicles. In addition, they are equipped with fabricated chassis frames of high-tensile steel; and have all-aluminum tilt cabs. These features combine to produce major results in reducing dead weight and, in turn, increasing payload capabilities.

Both tractors are only 48-in. from bumper to back of cab. The DLR-8000 weighs 9,987 lb, including the fifth wheel, 100-gal of gasoline, and the driver; while its companion model will be even lighter. The DLR-8000 will offer a new 18,000-lb spiral-bevel, two-speed rear axle; as well as a five-speed overdrive transmission. It goes into production late in November, while the DFR-8000 will be on the assem-

Rear axle suspension utilizes air cylinder mounted between the chassis frame and a radius arm that is one member of the two sets of radius rods provided for axle positioning and control



bly lines early in January.

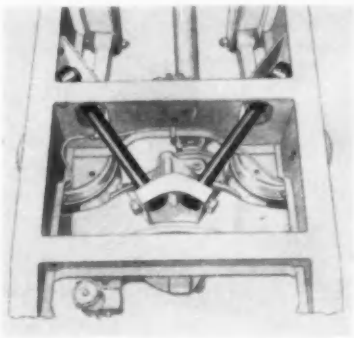
The air suspension system, for both front and rear, has been designed around single-convolution-type air cylinders; thus eliminating the need for the additional air reservoir provided previously by the tubular axle.

Front suspension is of knee-action type, and is rated at 11,000 lb. The air cylinder is mounted between the lower arm and the heavy stamping at the upper end. This housing also provides the attachment for upper end of the shock absorber.

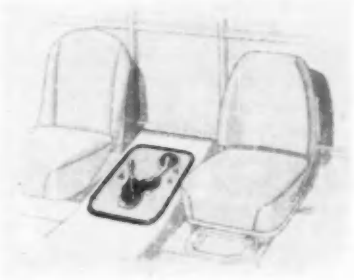
The rear suspension employs two sets of radius arms for positioning the rear axle. Each air spring is nested between the lower side of the frame and a horizontal radius arm. Lateral stability is afforded by two laterally-mounted radius rods, located above the rear axle, which attach to the frame at the forward ends and over the rear of the axle at the other ends.

These tractor models are powered by two-stroke Detroit Diesel engines.

The new frame is of welded I-beam construction, made of SAE 950 high-tensile steel. It has 3/16-in.-thick top flanges continuously welded to light steel webs. This frame is said to weigh only half as much as the conventional channel type.



Radius rods over the rear axle on GMC's new model DLR-8000 highway tractor stop lateral sway, giving the new air ride suspension the required stability



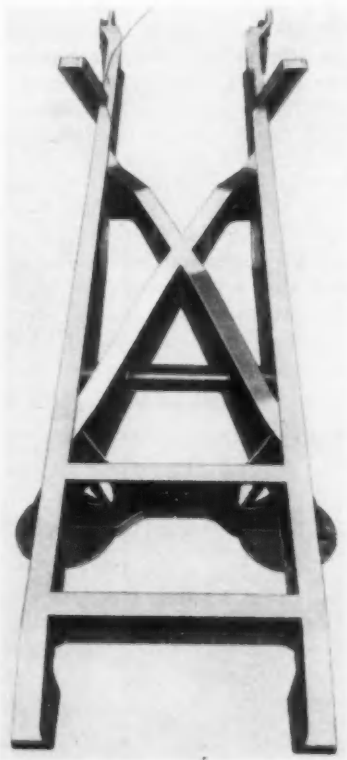
The control island for the new GMC highway tractor, DLR-8000, brings the controls to the driver within easy reach of his right hand. When the cab is tilted for maintenance work the island stays in its fixed position, doing away with any need for long flexible control cables, and rods

Aluminum is used throughout the cab framing, reinforced pressed floor, welded exterior roof and back panels, and door assemblies. Further weight savings are effected by the use of fiberglass fenders, headlamp panels, and lattice type grilles.

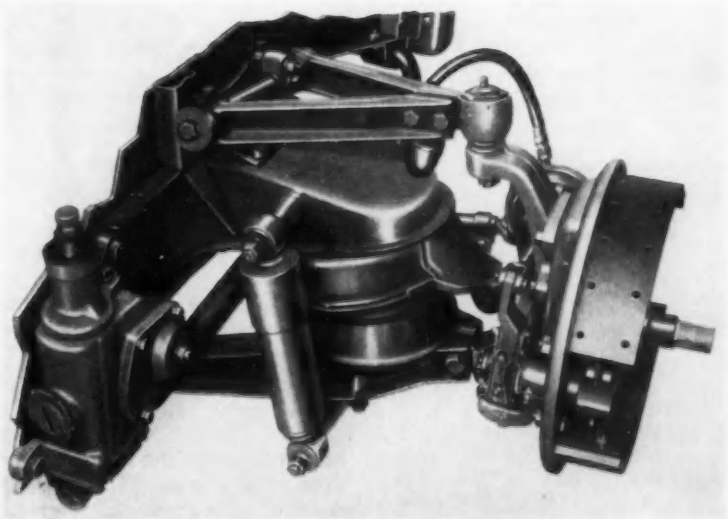
Where a sleeper cab is desired, an available option is an all-aluminum sleep compartment attached to the back of the cab. While with the sleeper, overall length from bumper to back of cab increases from 48 to 72 in., the fifth wheel location is such that front and rear axle loadings are virtually unaffected.

The new tilt cab feature allows tilting forward manually because cab weight is counterbalanced by torsion bar type springs. All sheet metal and attachments form an integral part of the cab, permitting unobstructed access to the engine and controls for service. ■

The new fabricated frame, said to weigh only half as much as conventional channel type frames, is one of the design features of GMC's Model DLR-8000 highway tractor. Using high tensile steel, the frame is of welded I-beam type construction



Front wheel suspension on GMC DLR-8000 is of the knee-action type combined with convolute-type air cylinder



Mercury Monterey four-door sedan has roof with overhang at rear

20th Anniversary Models Launched by

IN its 20th Anniversary models, Mercury offers a distinctive line tailored for the medium-priced field. Unlike its previous offerings, Mercury now boasts new bodies and chassis designed exclusively for its cars, not shared by any other division of the company. Completely new sheet metal has enabled the stylists to create a fresh appearance with clean lines and simple but tastefully-executed decoration.

In keeping with the times, the cars are lower. Lowering of roof line is usually accompanied by bigger tunnels. Mercury has solved this problem by extending the wheelbase so as to move the engine farther forward, thus reducing driveline angularity and, in turn, tunnel height. Wheelbase now is 126-in. for Monterey, Montclair, and station wagons; 128-in. for Park Lane.

Coincident with this, the tread has been widened both front and rear to provide additional room under the hood, as well as to accommodate a wider frame. Front and rear tread now is 60 in. on all models, except the Park Lane which has a 62-in. rear tread.

The line-up of series is as follows: Passenger cars are designated Monterey, Montclair, and Park Lane. The hardtop-styled "Country Cruiser" station wagons are named Commuter, Voyager, and Colony Park. The Commuter comes in two models—a two-door, as well as a four-door.

Unique feature of the passenger car line is the use of two different styles of roof treatment. Hardtop models have a "cruiser" roof that flows from the windshield to the tip of the rear window, while the sedan roof is quite flat and has an overhang at the rear.

An interesting departure from usual practice is the adoption of large windshield wipers that operate in parallel and clean a greater area of the glass. This arrangement permits strokes of the blades

Rear view of Mercury Park Lane hardtop shows "cruiser" styling

to overlap each other. At the same time, Mercury has adopted electric wipers as standard equipment.

The chassis frame is new, longer, wider, and stronger than before, retains the box section side rail and ladder-type construction. Convertible frames have an X-member in place of the No. 3 cross member, as well as an added tubular cross member.

Three basic engines are available. The 312-cu-in. V-8 is offered for the Monterey series. The 383-cu-in. V-8 with two-barrel carburetor also is available on the Monterey, standard on the Commuter station wagon. The same engine with a four-barrel carburetor is standard on the Montclair series, and Voyager and Colony Park station wagons. The 430-cu-in. V-8 with four-barrel carburetor is standard in the Park Lane series.

Compression ratio for the 312-cu-in. engine is 8.75 to 1, the others being 10 to 1. This represents a slight decrease from last year in keeping with the octane rating of fuels available over the entire country.

Among detail improvements in the 383 and 430-cu-in. engines are the following: Introduction of a new type of pushrod made of tubular material with bearing balls welded at the ends to reduce wear; a change to 45-deg angle on intake valves; and employment of a barrel-shaped valve damper spring to prevent cramping.

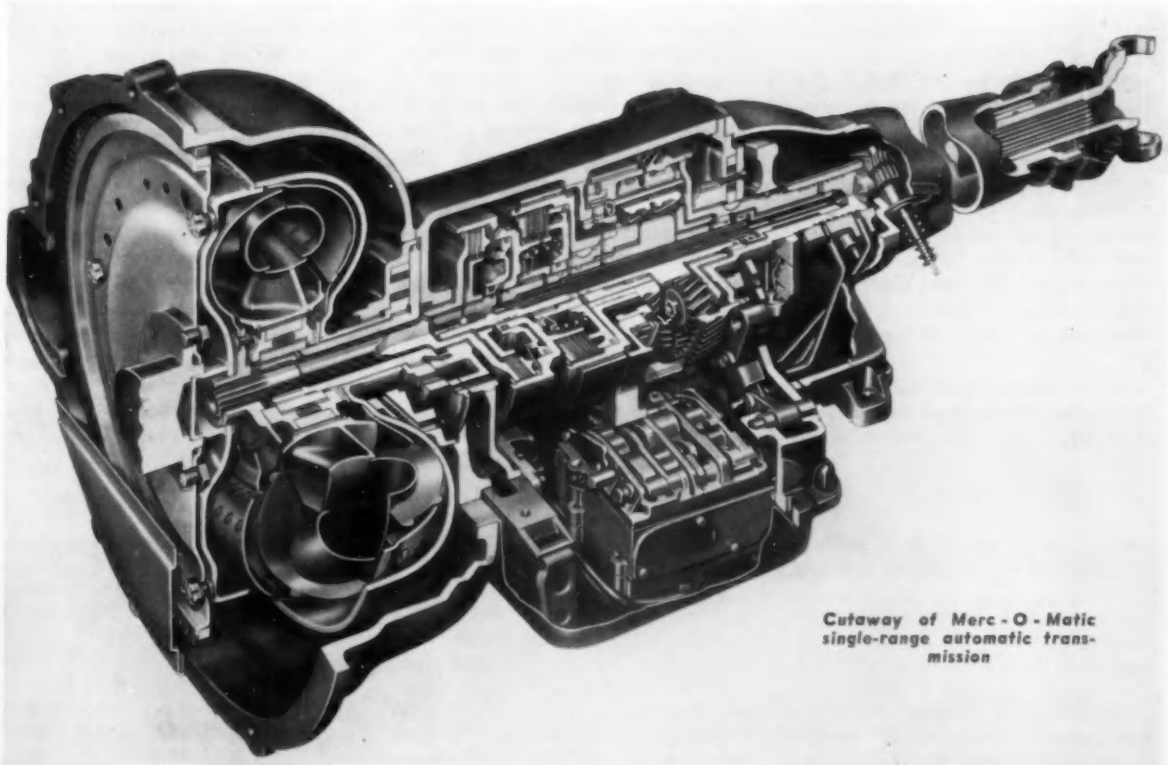
Two types of automatic transmissions are offered this year. The single-range Merc-O-Matic is of three-speed type, simplified in construction and lower-priced. The Multi-Drive, or dual range Merc-O-Matic, is similar to the unit offered heretofore. Pushbutton controls have been eliminated and are replaced by steering-column-mounted levers.

MERCURY

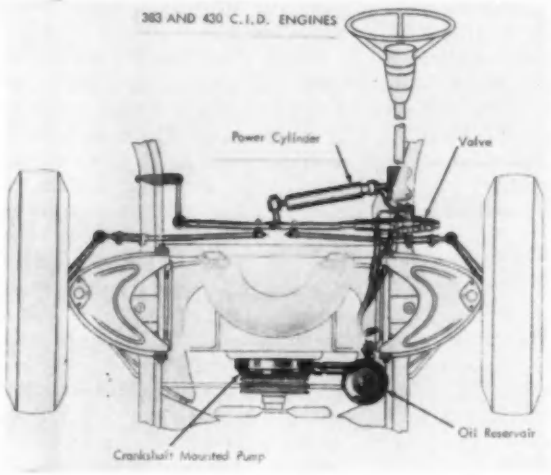
While the front suspension retains coil springs, ball joints, and swept-back lower arms, a number of things have been done to effect a better ride and improved handling. An anti-dive feature, to reduce front end dipping when braking, is one of these. It is accomplished by tilting the leading edge of the upper suspension arm upward at an angle of 12-deg from the horizontal. A link type sway bar is now employed.

Another feature of the front suspension is the improved camber-caster adjustment. To this end, the upper-arm-shaft attaching plate has slotted holes to allow lateral movement of the shaft; the bolt-hole-boss surfaces on the shaft being knurled. The knurled teeth bite in and lock the shaft to the attaching plate after caster and camber adjustments are made. Shims were used formerly.

Rear suspension has been improved in many respects. The leaf springs have been increased in size



Cutaway of Merc-O-Matic single-range automatic transmission



1959 MERCURY ENGINES

OHV—V-8's

	Monterey	Monterey Commuter	Montclair Voyager Colony Park	Park Lane
Bore (in.)	3.80	4.30		4.30
Stroke (in.)	3.44	3.30		3.70
Displacement (cu in.)	312	383		430
Compression Ratio	9.6	10.0		10.0
Bhp (max.)	235	280	322	345
Torque (lb-ft) max.	325	400	420	480
Carburetor	2-bbl	2-bbl	4-bbl	4-bbl

MERCURY LINKAGE POWER STEERING

to 60 x 2½ in., with five leaves for Park Lane, six for the Monterey, and seven in all station wagons. Tips are separated by means of new polyethylene liners held in place by two molded buttons. Springs are of valuable rate type with a short stiff section at the front. Spring wrap-up is resisted by large butyl rubber bump-earsers, butyl rubber also being used in the jounce bumper on the frame over the axle.

It may be noted, too, that in the plan view leaf springs are mounted on an angle of six degrees to the horizontal so they are wider-spread at the rear than at the front.

While the manual steering gear system is similar to the one used last year, it has linkage modifications to suit the new chassis and incorporates a flexible joint between the gear box and the steering post.

While power steering still retains the linkage type booster, on cars equipped with the 383 and 430-cu-in. engines it becomes possible to provide a more balanced control, together with less steering effort. Overall steering ratio has been reduced to 20.5 to 1, reducing wheel turns to 3⅔ turns, stop to stop. Effort on the steering wheel now is reduced to three to four pounds.

It has been effected by relocating the power cylinder, the fixed end being moved to a bracket on the left-hand side of the chassis. This improves the parallelogram of forces transmitted by the cylinder, placing the line of force in a direct line through the pivot points. The change in power steering geometry stems from the fact that a new hydraulic pump is now used, mounted integrally with the vibration damper on the front end of the crankshaft.

Monterey cars equipped with the 312 engine will continue to use the 1958 type linkage system, requiring an effort of some eight pounds on the steering wheel.

Self-adjusting brakes are continued as standard equipment. Brakes are 11-in. diam, with a 3-in. wide lining at the front, 2½ in. lining at the rear.

The power brake system has been improved and simplified in linkage to permit quick changeover from manual to power brakes by the dealer. In this setup the same pedal is used for both standard and power brakes.

Single exhaust is standard on all Monterey, Montclair, and station wagon models. Dual exhaust is standard on Park Lane, optional on all other models except Monterey with the 312 engine. The exhaust system has been cleaned up by the elimination of separate resonators, except in the case of convertibles, the latter using a system similar to the one in 1958. Ball-joint connections are now used at the manifolds. Increased muffler life is claimed through the use of aluminized steel for inner shells, ends, baffles, and passage tubes. The outer wrap is galvanized.

Engine mounts are new this year, with both front and rear mounts containing more rubber. Design of mounts is simplier, and stresses the rubber both in shear and compression. Front mounts are relocated lower and rearward. ■

Beryllium Corp. Gets Contract To Develop New Casting Method

Beryllium Corp. announced it has received a large Air Force R&D contract to develop a new method of producing ductile castings of beryllium metal.

At present, all commercial grade beryllium is fabricated by powder metallurgy, because beryllium ingots are not suitable for further wrought processing.

Under the terms of the contract, Beryllium Corp. will try to produce castings of beryllium by more conventional processes, including centrifugal, pressure, and vacuum castings techniques.

The Air Force is interested in using beryllium for structural applications. The metal is three times stronger than steel on a strength-to-weight basis; its weight is the same as magnesium; and it retains its strength at temperatures up to 1200 F.

Four separate divisions of Beryllium Corp. will take part in the contract work—the Alloy Div., the Precision Casting Div., and the Nuclear and Fabrication Divs.

1959 EDSEL

Offers Six-Cylinder Engine As Economy Option

FOLLOWING a new avenue in its marketing approach for 1959, the M-E-L Division is grooming the Edsel line to compete in a so-called upper-low-priced bracket. To this end Edsel will feature just two series and a station wagon, in freshly-tailored sheet metal that gives a new look to the unique front end treatment that characterized the line last year.

The cars have been treated to some noteworthy mechanical changes in the interest of simplification and holding the cost line. For example, air ride, as an option, has been eliminated. Too, the push-button transmission controls are out, replaced by the usual steering column lever. Another major item is the introduction of an OHV six-cylinder engine option for car owners interested specifically in fuel economy.

In addition to these important changes, Edsel offers a new automatic transmission, the Mile-O-Matic, a two-speed unit which has the features of an automatic drive in an extremely low-priced package, lighter in weight and with less parts.

1959 EDSEL OHV ENGINES

Brief Mechanical Specifications

	Ranger, Villager Optional	Ranger (Std.)	Corsair and Villager (Std.), Ranger (Optional)	All Models (Optional
Type and No. Cyl.	I-6	V-8	V-8	V-8
Bore (in.)	3.62	3.75	4.00	4.05
Stroke (in.)	3.60	3.30	3.30	3.50
Displacement (cu in.	223	292	332	361
Compression Ratio	8.4	8.6	8.9	9.6
Bhp (max.) @ rpm	145 @ 4000	200 @ 4400	225 @ 4400	303 @ 4600
Torque (lb-ft) max.	206 @ 2200	285 @ 2200	325 @ 2200	390 @ 2900
Carburetor	1-bbl	2-bbl	2-bbl	4-bbl
Transmissions:				
Synchromesh	Std.	Std.	Std.	NA
Mile-O-Matic	Opt.	Opt.	Opt.	Opt.
Select-O-Matic	NA	NA	NA	Opt.

Series designations are: Ranger and Corsair passenger cars, and Villager station wagon. The cars have a wheelbase of 120 in., while the station wagon has 118-in. wheelbase.

In addition to the 145-hp OHV Six, Edsel will have three OHV V-8's. Standard on the Ranger is a 292-cu-in. V-8. Standard on the Corsair and Villager is a 332-cu-in. V-8. The six-cylinder engine is available as an option on the Ranger and Villager. These engines will operate on regular grades of gasoline. Additionally, there is a 361-cu-in. V-8, optional on all Edsels, operating on premium-grade fuels.

The engines have high lift camshafts for improved low speed torque. Hydraulic valve lifters are standard on the 332- and 361-cu-in. V-8's. Carburetors have been redesigned for better operations and easier servicing.

(Turn to page 88, please)

1959 Edsel Corsair four-door hardtop sedan

Use of CO_2 Arc Welding Expanding in

New Process Limits Weld Current to Permit "All-Position" Welding of Light Gage Metals with Larger and Lower-Cost Wire Sizes

THE importance of arc welding in all its forms has long been recognized by the automotive industries as a valuable manufacturing aid. Now, the installation of a new CO_2 welding process in several automotive body and vehicle assembly plants is said to provide many opportunities for lowering production costs.

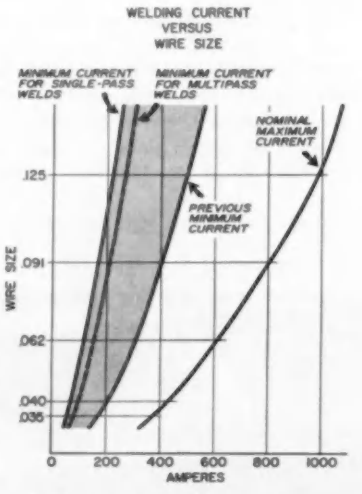
Experimental Work

During the past four or five years, considerable experimental work has been carried on with different low-cost gases to reduce further the cost of the arc welding process. Carbon dioxide has shown the most promise among these gases, even though its adoption on a broad scale had seemed somewhat dubious at first because of its chemical breakdown. Although many successful applications have been made, certain characteristics—deep penetration, high minimum required current, narrow bead width, and high spatter loss—have limited widespread usage of the CO_2 process.

In the course of recent research work done to overcome some of these disadvantages, it was discovered that the electrical characteristics of the welding power supply have considerable effect on the arc characteristics of the CO_2 process using bare or coated wires.

Marked Improvement

The range of applications for gas-shielded arc welding using carbon dioxide now bears every promise of being greatly expanded through the development by the Welding Division of Westinghouse Electric Corp. of a new CO_2 welding process. A marked improvement in the West-Ing-Arc CO_2 process, it consists basically of a direct-current Dynamic Reactor (trade name Dynactor) to be added to the welding output circuit of power sources of semi-automatic and automatic gas-shielded welding equipment. The unit is designed for use with any constant potential, constant wire speed system of metallic inert-gas (MIG) welding. It does not work in a constant current system using a drooping type power source.



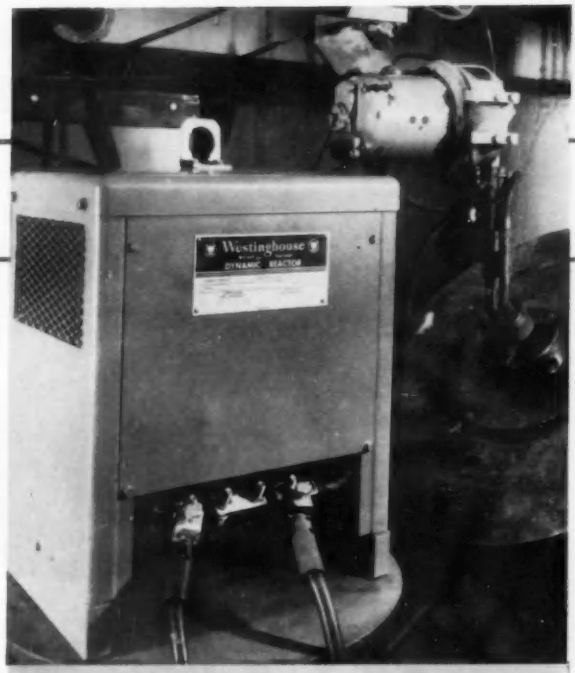
A major benefit of the new Westinghouse Dynamic Reactor is the ability to weld with larger and less costly wire. Previous current range for a given wire size is shown between two curves at right. Two curves at left indicate extent to which minimum current is reduced by use of Reactor.

Lower Minimum Currents

The Reactor enables the reduction of minimum current on both the CO_2 and argon welding processes by a factor of more than 2 to 1 on all wire diameters. For example, the minimum current on 1/16-in. diam wire can be reduced from 300 amp to about 100 amp. This makes possible for the first time "all-position" welding of mild steel, aluminum, stainless, and other non-ferrous materials, such as magnesium. Semi-automatic MIG welding is now virtually unlimited because the process will weld anywhere the gun can go. Furthermore, even at 100 amp, the spatter is practically nil, a second factor that will make practical use of the process in production without clogging the nozzle of the weld-

Automotive Plants

By
Andrew W. Shearer



Model 300/600 Amp Dynamic Reactor is designed to serve as an auxiliary to many conventional power sources.

ing gun or handicapping production.

Lower Material Thickness

Lower currents also extend the range of minimum material thickness which can be welded. Previously, the CO_2 process had so much penetration that the minimum thickness of metal which could be butt-welded was ⅛-in. on a copper back-up to absorb heat. Now butt welds can be made on 0.040-in. material using the same electrode diameter.

Increased Automotive Uses

In the automotive industry it is anticipated that widespread use of the process will be made on many types of automobile body work—door frames and seat backs, for example—on torque tubes, mufflers, vanes, automatic transmissions, and housings; and on other applications where thin gage materials are used that up until now could not be joined by conventional arc welding processes.

Higher Costs Offset

While it is true that welding costs are increased when the welding current is decreased, the new Westinghouse process allows usage of a larger diameter wire at any given current, with better bead width, less penetration, better appearance, and at reduced costs, since larger wires are less costly than small ones. Previously, the MIG and CO_2 processes have used wires from 0.040 in. to 0.091 in. at currents from 200 to 600 amp. Now, wires from 0.040-in. to ⅛-in. diam can be used at currents ranging from 75 amp to 800 amp. For example, one automotive manufacturer welding torque tubes went from 0.040-in. to ⅛-in. wire at a saving of 25 per cent in materials cost and achieved a 30 per cent faster production rate.

This weld is on a torque tube assembly for trucks, and joins a 1/16-in. mild steel tube to a high carbon forging. Wire used was ⅛-in. MS-21, weld current 230 amp, and arc voltage 21 volts. Weld was formerly made with 0.040-in. wire. Time required was reduced from 7 to 5 sec.

Two Models in Use

Two Dynamic Reactor models of 150/300 amp and 300/600 amp are in use. The 150/300 is for nominal gage materials in semi-automatic setups and on thin gage applications, either semi- or fully automatic. The 300/600 is best suited for high-speed automatic and higher-current semi-automatic applications. Occupying little floor space, they may be placed wherever is convenient. They are convection cooled with no moving parts. ■

New Tractor-Loader Introduced by Ford

Larger and heavier than Ford general-purpose tractors, the new Ford industrial tractor used in this tractor-loader combination has a 7000-lb-capacity-front axle

FORD MOTOR COMPANY'S new tractor-loader combination has two-and-a-half times the lift capacity of any previous Ford loader. It is comprised of a new industrial tractor, with a 7000-lb-capacity front axle, and a new "Super-Duty" loader, developed for use with the tractor.

Two models of the tractor are offered: The 1821 is the basic standard-equipped model; while the 1841, in addition to base equipment, has power take-off and an internal hydraulic system with three-point linkage for rear-attached equipment. Both use the same four-cylinder 172-in-cu-in. gasoline engine as standard. A Diesel engine is available as an option. Transmission is a four-speed, constant-mesh, helical-gear type. Optionally available is a shuttle-transmission for rapid forward and reverse work.

A malleable iron combination grille and bumper encloses and protects the headlights, cooling system, hydraulic reservoir and pump. This grille is attached to the tractor's load-carrying frame. The shock-absorbing structure of the loader is also attached to this frame.

The tractor is equipped with power steering. Less than a complete turn of the steering wheel is needed to go from straight ahead to full right or full left.

The "Super-Duty" loader has 2500-lb lift capacity, 5500-lb breakaway limit, ligt height of 10 ft 8 in., and dump height of 8 ft 5 in. Bucket sizes for heavy and medium materials are, respectively, 5/8 and 3/4 cu yd. A full-cubic-yard bucket is also available.

Hydraulic power for the loader comes from a independent "universal" hydraulic package, obtainable as a factory installation. The package includes oil reservoir, pump, oil cooler, filter and control. Maximum system pressure is 2000 psi. Pump is of the gear type, with a capacity of 15.5 gpm at 1600 rpm of engine. ■

SPECIFICATIONS FORD INDUSTRIAL TRACTOR

Models 1821 and 1841

General:	
Wheelbase	81.5 in.
Overall Length	128.0 in.
Turning Circle Diameter, with brakes—approx.	22.0 ft
Shipping Weight (approx.)	3800 lb
Engine:	
Type	4-cylinder, in-line, overhead valve
Bore	3.90 in.
Stroke	3.60 in.
Displacement	172 cu. in.
Compression Ratio	7.5 (gasoline)
Rated Horsepower (drawbar)	42.5
Clutch	10-in., single plate
Transmission	4-speed, constant-mesh, helical gear

AUTOMOTIVE INDUSTRIES . . .
is your News Magazine of Automotive and Aviation
MANUFACTURING

1959 Lincoln four-door hardtop sedan features major restyling

Numerous Improvements in

1959 LINCOLN and CONTINENTAL

For 1959, Lincoln and Continental cars have been treated to considerable change both in front and rear end appearance, although the basic body structure remains substantially the same.

Three series are offered this year—the Lincoln, Lincoln Premiere, and Continental Mark IV. Each of the series includes two- and four-door hardtops, and four-door sedans. The convertible is available only in the Continental. The Continental, in addition, offers a Formal Sedan, and an Executive Limousine. The latter model has a center partition, consisting of a curved glass partition window, power-operated from either the front or rear compartment.

Unitized body construction has worked out very satisfactorily. Some stiffeners have been added at various points primarily to reduce vibration, but nothing had to be done to increase strength or rigidity. The rustproofing dip process adopted at the start of production last year has been extended materially by immersing the entire body up to the belt line. Lincoln has continued the use of a water-soluble, latex-base paint for this purpose.

Hydraulic power brakes are standard, an advance this year being the introduction of automatic brake adjustment.

The rear suspension is of trailing arm design, cradling coil springs. A track bar is mounted at the rear end with one end fastened to the left-hand side of the underbody, the other end attached to the right-hand end of the axle housing.

The 430-cu-in. OHV V-8 engine is substantially the same as before, but incorporates many detail improvements. Increased smoothness and quietness of operation are aided by new engine mounts, a redesigned camshaft, a new spark curve, new carburetor, and a new air cleaner. The engine is rated 350 bhp at 4400 rpm. Maximum torque is 490 lb-ft at 2800 rpm. Compression ratio is 10 to 1.

The dual exhaust system makes use of aluminized steel, promising considerably longer life.

One of the major engine changes has been the adoption of a new Carter four-barrel carburetor in which the auxiliary throttle plates, above the secondary plates, are operated by the velocity of the mixture stream rather than by vacuum.

The Twin-Range Turbo Drive transmission, offered as standard equipment in 1959, has a fully automatic and modulated shift between first and second gear, provides for an automatic low-gear start and reduced converter slippage.

Some important improvements have been made in the driveline. Every driveshaft is given an index mark, during balancing, for coupling with a similar mark on the axle yoke or axle companion flange. These matched components help to compensate for any slight out-of-balance condition, add to quiet running operation. Another element designed to keep driveline vibration to the minimum is the addition of weight at the extreme rear of the driveshaft.

The directed-power differential is offered as optional equipment.

The dual exhaust system, standard on all models, features new balljoint connections at exhaust manifolds, mufflers of larger cross-section, and a shortened resonator. Another feature is a special crossover pipe located behind the engine. Its function is to equalize the shock waves of alternate exhaust pulses. The two resonators are made of zinc-coated steel. ■

• • INDUSTRY STATISTICS • •

WEEKLY U. S. MOTOR VEHICLE PRODUCTION

As reported by the Automobile Manufacturers Association

Make	Weeks Ending Oct. 11	Weeks Ending Oct. 4	Year to Date 1958	Year to Date 1957
PASSENGER CAR PRODUCTION				
Rambler	5,861	1,943	139,912	78,158
Total—American Motors	5,861	1,943	139,912	78,158
Chrysler	329	388	37,441	96,926
De Soto	586	402	26,686	98,157
Dodge	2,890	2,202	82,064	236,869
Imperial	231	190	9,072	31,296
Plymouth	3,709	2,497	276,360	533,349
Total—Chrysler Corp.	7,745	5,679	431,622	994,597
Edsel	534	308	9,383	44,450
Ford	18,803	3,989	695,501	1,184,898
Lincoln	265	155	18,134	29,690
Mercury	.....	.....	84,949	228,753
Total—Ford Motor Co.	19,602	4,452	797,967	1,487,799
Buick	.....	3,277	163,501	301,374
Cadillac	.....	1,137	93,200	120,943
Chevrolet	.....	9,644	910,311	1,133,003
Oldsmobile	.....	2,941	218,664	297,122
Pontiac	.....	2,135	145,562	262,844
Total—General Motors Corp.	.....	19,134	1,531,328	2,115,286
Packard	.....	.....	1,723	4,631
Studebaker	1,626	1,187	24,414	50,920
Total—Studebaker-Packard Corp.	1,626	1,187	26,137	55,551
Checker Cab	22	31	2,173	3,148
Total—Passenger Cars	34,856	32,426	2,929,139	4,734,539
TRUCK AND BUS PRODUCTION				
Chevrolet	.....	4,263	198,473	267,282
G. M. C.	.....	827	44,469	52,099
Diamond T	139	136	4,302	4,409
Divco	70	70	2,226	2,439
Dodge and Fargo	706	608	41,787	61,223
Ford	5,952	5,172	164,469	289,477
F. W. D.	31	33	986	896
International	1,855	1,985	72,006	98,857
Mack	262	26	11,233	13,846
Studebaker	216	183	7,516	10,826
White	415	400	12,952	15,206
Willys	2,128	1,947	67,275	56,906
Other Trucks	50	55	2,567	3,358
Total—Trucks	11,827	15,705	630,261	856,826
Buses	15	25	2,532	3,240
Total—Motor Vehicles	46,698	48,157	3,561,932	5,594,605

1958 TRUCK TRAILER SHIPMENTS

Industry Division, Bureau of the Census

Type of Trailer	August	Eight Months 1958	Eight Months 1957
Vans			
Insulated and refrigerated	260	2,213	3,295
Steel	28	241	458
Aluminum	232	1,972	2,837
Semi-insulated	66	380	435
Steel	19	380	77
Aluminum	47		358
Furniture	100	1,096	1,217
Steel	94	1,096	1,102
Aluminum	6		115
All other closed top	1,484	10,158	13,915
Steel	407	3,422	6,440
Aluminum	1,077	6,736	7,475
Open-top	296	1,291	2,183
Steel	136	672	1,094
Aluminum	160	619	1,089
Total—Vans	2,206	15,138	21,045
Tanks			
Non-and low pressure			
Petroleum			
Carbon and alloy steel	173	1,456	.....
Stainless steel	16	137	.....
Aluminum	135	882	.....
Total—Petroleum	324	2,475	3,420
Chemical, food, fluid solids	29	428	.....
All other, incl. aircraft refuelers	44	255	.....
High pressure (LPG, chemicals, etc.)	30	198	.....
Total—Tanks	427	3,356	4,625
Pole, pipe and logging			
Single axle	29	219	376
Tandem axle	66	352	530
Total	95	571	906
Platforms			
Racks, livestock and stake	121	1,018	1,712
Grain bodies, all types	101	617	1,040
Platforms (flats), all types	639	3,782	5,052
Total—Platforms	861	5,417	7,804
Low-bed heavy haulers	189	1,621	2,229
Dump trailers	250	1,733	1,561
All other trailers	186	1,354	2,540
Total—Complete Trailers	4,214	29,190	40,710
Trailer chassis[1]	299	2,111	2,996
Total—Trailers and Chassis	4,513	31,301	43,706

[1] Sold Separately.

REGIONAL SALES OF NEW PASSENGER CARS

Zone	Region	August 1958	July 1958	August 1957	Eight Months 1958	Eight Months 1957	Per Cent Change: Aug. over July	Aug. over Aug. 1957	Eight Months 1958 over 1957
1	New England	20,022	24,571	26,958	175,889	220,856	−18.51	−25.73	−20.36
2	Middle Atlantic	72,907	83,782	95,054	618,472	795,985	−12.87	−23.20	−22.30
3	South Atlantic	51,121	47,801	61,960	403,776	522,179	+ 6.95	−17.49	−22.67
4	East North Central	85,939	91,150	118,062	732,676	1,014,705	− 5.72	−25.70	−27.79
5	East South Central	16,102	16,205	24,847	136,551	198,226	− .64	−35.20	−31.11
6	West North Central	36,044	39,951	46,455	308,193	358,291	− 9.78	−22.41	−13.98
7	West South Central	34,019	36,634	48,244	287,012	383,883	− 7.14	−29.49	−25.23
8	Mountain	14,543	15,550	18,277	116,309	137,275	− 6.48	−20.43	−15.27
9	Pacific	40,069†	44,641*	49,176†	300,620*	462,690*	−10.24	−18.52	−22.06
	Total—United States	370,856†	400,286*	486,633†	3,139,500*	4,094,090*	− 7.35	−23.79	−23.32

* Does not include Oregon for July. † Does not include Oregon for August. * Does not include Oregon for July or August.

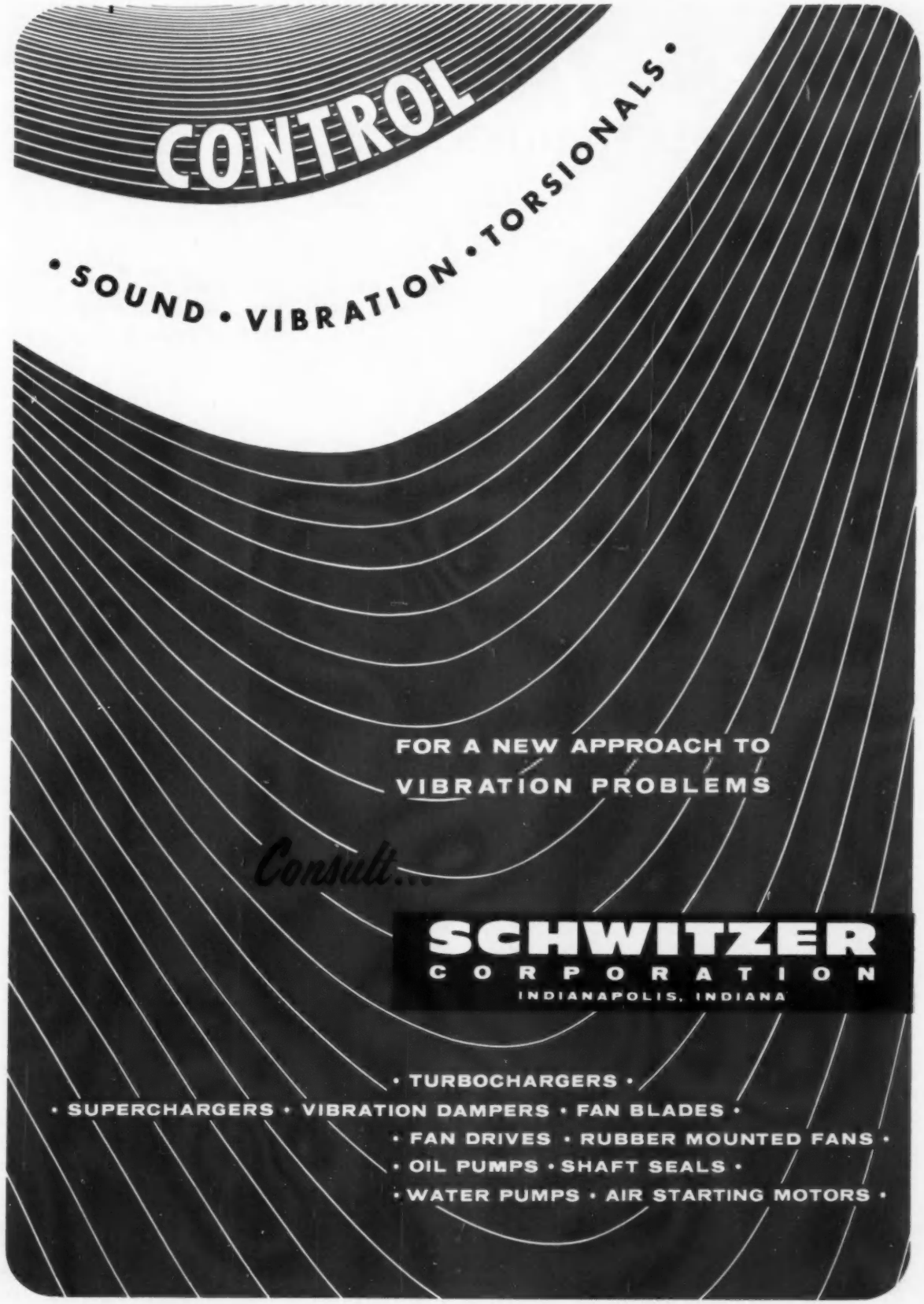
States comprising the various regions are: Zone 1—Conn., Me., Mass., N. H., R. I., Vt. Zone 2—N. J., N. Y., Pa. Zone 3—Del., D. of C., Fla., Ga., Md., N. C., S. C., Va., W. Va. Zone 4—Ill., Ind., Mich., Ohio, Wis. Zone 5—Ala., Ky., Miss., Tenn. Zone 6—Iowa, Kan., Minn., Mo., Neb., N. D., S. D. Zone 7—Ark., La., Okla., Tex. Zone 8—Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo. Zone 9—Cal., Ore., Wash.

1958 TRUCK FACTORY SALES BY G.V.W.

As reported by the Automobile Manufacturers Association

Period	6,000 lb. and less	6,001-10,000 lb.	10,001-14,000 lb.	14,001-16,000 lb.	16,001-19,500 lb.	19,501-26,000 lb.	26,001-33,000 lb.	33,000 lb. and over	Total
First Quarter	111,337	32,659	3,507	22,913	25,006	13,661	8,674	6,725	224,482
Second Quarter	104,198	33,127	3,804	23,112	26,619	14,025	6,964	7,996	219,865
Total—Six Months	215,535	65,786	7,311	46,025	51,625	27,686	15,650	14,721	444,347
July	32,958	9,271	1,005	7,223	6,502	3,619	2,083	2,387	65,048
August	26,455	8,161	859	4,380	7,246	3,936	2,191	1,999	55,227
Total—Eight Months—1958	274,948	83,218	9,175	57,628	65,373	35,241	19,932	19,107	564,622
Total—Eight Months—1957	.....	.....	.....	.....	.....	.....	.....	.....	.....

* Data for first six months have been revised.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News of the MACHINERY INDUSTRIES

By Charles A. Weinert

Trade Mission to India Will Promote Sales of American Machine Tools and Other Products. A Special Exhibit Will Feature Production and Service Equipment

Mission to India

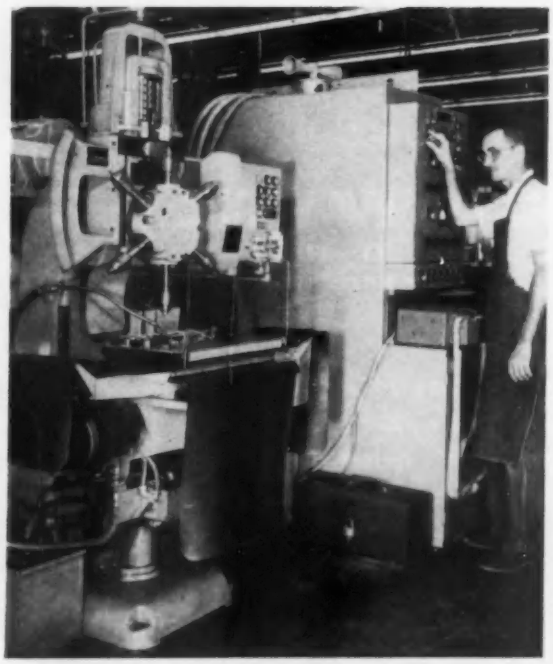
A group of five American businessmen are due to arrive in India November 10, on a two-month Government trade mission designed to increase interest in U. S. machinery and products.

Members of the trade mission will spend a month touring 15 major cities in an area near New Delhi, India. From December 10 through January 10, a special exhibit with the theme "The Place of Small Private Enterprise in a Developing Economy," will be set up in New Delhi and the mission will make its headquarters there.

The exhibit will feature a series of small shops equipped to produce products or perform a service. It will include machine tools, hand tools, small furnaces, forming equipment, and similar machinery. Some exhibitors will actually be making finished products.

Nathaniel Knowles, deputy director of the Commerce Department's Bureau of Foreign Commerce, is leader of the mission. Two of the group members are Herbert Harig, president, Harig Mfg. Corp., and Wallace E. Carroll, president, American Gage and Machine Co. Others include a retailer, a banker, and a utility executive.

The mission is asking U. S. manufacturers interested in selling in India to provide it with catalogs and other product descriptive literature (through Niels A. Olsen, Director, Metalworking Equipment Div., Business and Defense Services Administration, Washington 25, D. C.).



Operator stands at Mark II control in General Electric Co. plant as it automatically controls Burgmaster six-spindle turret drill from process data on punched tape

Maker of Numerical Controls Follows Own Philosophy

General Electric Company's Specialty Control Dept. is literally "practicing what it preaches"—and evidently profiting by it in the way of reduced production costs.

Since the department makes a variety of short-run components, General Manager L. T. Rader considered it desirable to install one of his own controls—a packaged numerical control system called Mark II—on a Burgmaster turret drilling machine.

Early operating results have shown production time-savings ranging between 32 and 95 per cent on various jobs. Examples cited are:

1. Decrease in production time of 32 per cent in drilling, tapping, and countersinking a one-order lot of 20 base plates.

2. Drilling of 21 holes in a mounting foot for a static exciter—used in the electrical system of a supersonic jet fighter—reduced setup and operating time 69 per cent on seven lots of 61 pieces each. An expensive drill jig was eliminated.

3. On a single prototype part—a brush holder—100 holes had to be drilled. This operation took only 56 minutes, as compared to an estimated normal eight hours in the tool room.

4. Previously, 133 holes were punched into a diode cover, one at a time, on a punch press. Using the new equipment, 10 covers are stacked and drilled in one setup, eliminating special tools and resulting in a 95 per cent saving in time.

(*Turn to page* 70, *please*)

ARISTOLOY

Electric Furnace Steels

LEADED—Electric Furnace 52100 • Electric Furnace Alloy • Electric Furnace Carbon • Alloy Base Alloy • Alloy Base Carbon.

STAINLESS—300 Series • 400 Series • 500 Series.

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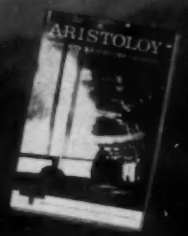
BEARING QUALITY • AIRCRAFT • PISTON PIN QUALITY • ELECTRIC FURNACE ALLOY • ELECTRIC FURNACE CARBON • ALLOY BASE ALLOY • ALLOY BASE CARBON



NEW PRODUCTS & FACILITIES CATALOG
Describes melting, rolling, thermal treating and finishing capacity of Copperweld's Aristoloy Steel Division. Complete product listing for Aristoloy carbon, alloy, stainless, leaded and nitriding steels. Send for your copy today.

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AUTOMATION NEWS REPORT

AUTOMATIC CONTROLS

PRODUCTION—VEHICLES—AIRCRAFT

By Samuel Cummings

STATIC-CONTROLLED TRANSFER MACHINES

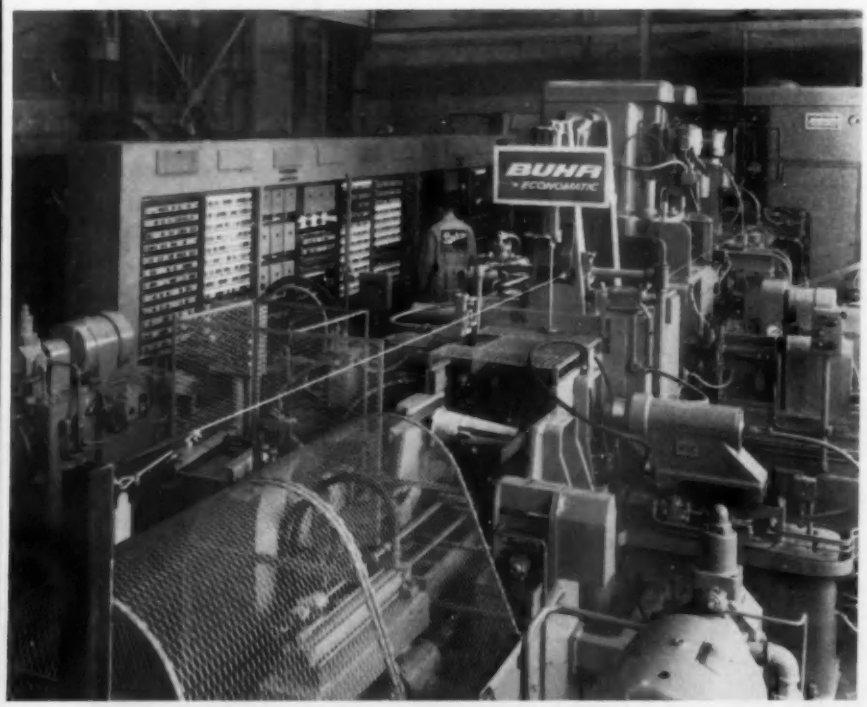
Static control—a method of controlling machines electrically by logic elements instead of relays—shows signs of catching on in the automotive industry.

One of the largest static control installations in the country is now in operation at Ford's new Sharonville, O., transmission plant.

Transfer machines in the plant are equipped with General Electric static controls. The machines handle rear end housing, front pump bodies, output shafts, and assemblies for Ford transmissions.

Two GE Pan-A-Trol static panels, each with 750 logic units, control machining operations on two Buhr transfer lines that handle rear extension housings for transmissions.

Front pump bodies of transmissions are machined by a Lamb transfer line controlled by 600 GE logic units from a JIC Electric Co. panel.



View from discharge end of Buhr transfer line showing GE static control panel with about 750 units (logic elements)—one of largest static installations in the country.

The transmission output shaft is machined by a Bilt-Rite transfer line. A JIC Electric Co. control panel with 450 GE logic units takes care of this part of the production line.

Two multi-station transfer machines built by Heald finish lower bodies for automatic transmission control valves. Six panels with 1890 GE logic units are used to control this operation.

General Electric engineers say that static control has a high degree of reliability and long life.

Although logic elements perform the same function as relays, they do it without the use of moving parts. Relays convert a single output to a coil into various outputs by means of a moving armature closing or opening contacts. Logic elements, on the other hand, convert a combination of inputs into a single output by controlling the impedance of an output coil on a magnetic core.

The logic function—on which static control circuits are based—has been used for years in the computer field. Basically, these functions are accomplished by four logic elements—AND, NOT, OR, and MEMORY—and a TIME DELAY.

The logic elements consist of cores made of square loop material, spool-wound coils, germanium rectifiers, resistors, and capacitors.

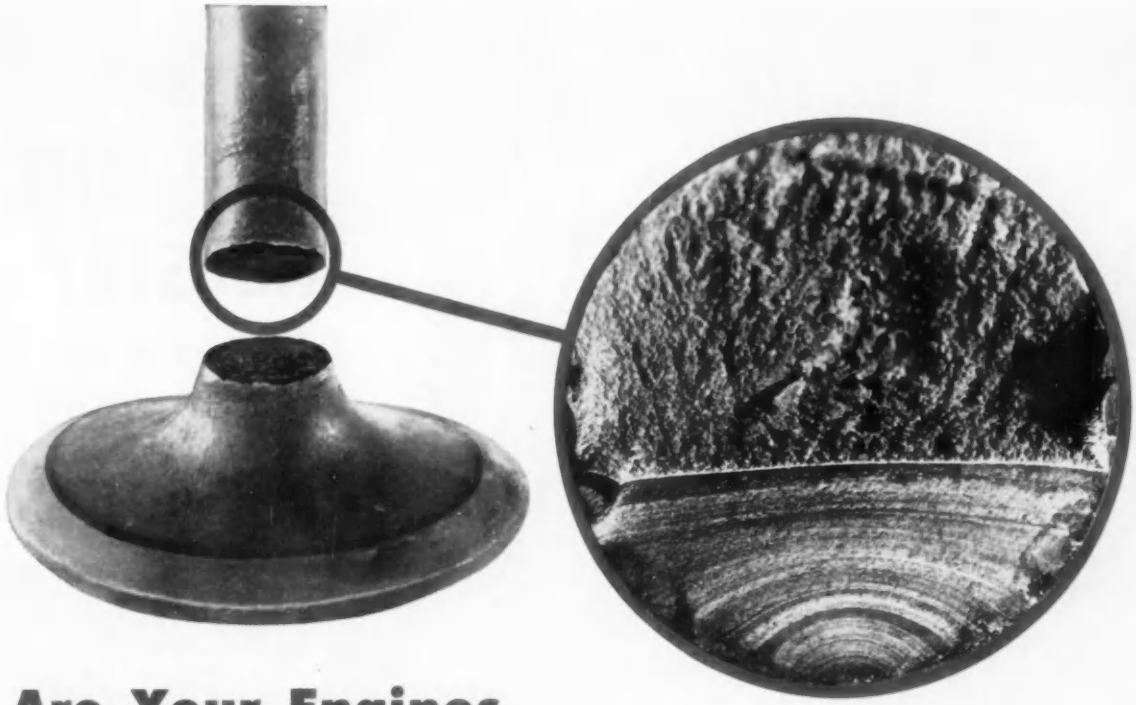
All electrical connections are of the plug-in type. Monitor lights attached to the plug-in elements provide a quick and accurate means of checking machine operation. The plug-in design makes maintenance simple whenever it is necessary to replace an element.

AUTOMATIC WELDING MACHINE

An automatic welding machine for automobile frames that follows any contour lines has been developed by Expert Welding Machine Div., Expert Die and Tool Co.

The machine's welding heads are controlled by a magnetic tape tracer system that permits metal parts to be joined in a continuous welding operation.

(*Turn to page 87, please*)



Are Your Engines Plagued by Failures Like This?

Eaton Engineers Can Help You Solve This Problem

The photographs above illustrate a typical fatigue-type failure caused by overstressing, in which fracture starts at the surface and, with repeated high stress, progresses to final break.

If you are an engine manufacturer and are having valve gear problems, Eaton engineers will be glad to consult with you and recommend procedures to help solve them. Or if you are designing new engines, perhaps our past valve experience can be valuable to you. Write, wire, or phone — there's no obligation.

Eaton Technical Reports are Available to Manufacturers

Eaton valve engineers will be glad to make a thorough study for you and furnish a complete technical report.

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Report from the

FARM EQUIPMENT INDUSTRY

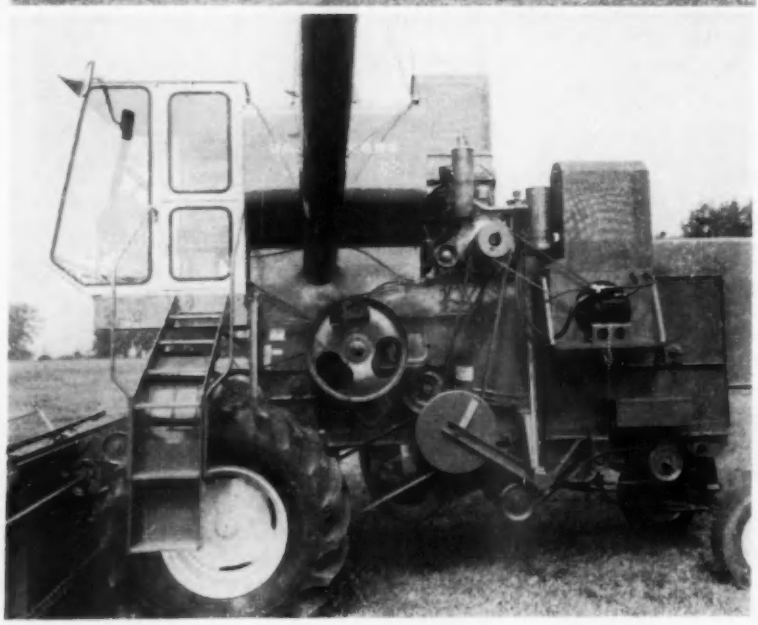
By Kenneth Rose

WITH farm equipment sales moving ahead nicely, manufacturers are now talking about the possibility of a 10 to 15 per cent betterment of last year's figures. This is part of a slow, continuing upward trend from the break in sales in 1956.

Department of Commerce figures for July, 1958 (the latest month for which they have been compiled) show that wheel-type tractors—excluding contractors' off-highway types and garden types—worth $37 million were shipped during that month. This value represented 16,677 units.

While the combined value of shipments of farm machinery and equipment and of wheel-type tractors was up 22 per cent over the average monthly shipments for 1954 and 1955, shipments of wheel-type tractors alone were down 3 per cent in value from the average for the same two years for that type of unit. Shipments of farm machinery and equipment were up a whopping 45 per cent over the two-year average.

John Deere Nos. 55 and 95 self-propelled combines are now offered with new enclosed and sealed cab having heater and/or air conditioner



For the first quarter of 1958, the Department of Commerce figure on sales of selected types of farm machines and equipment was $218,593,000, as compared with $121,331,000 in the preceding quarter, and $180,868,000 in the first quarter of 1957.

The indices of shipments of farm machinery and equipment and of wheel-type tractors for July of this year and for preceding years, and the indices for farm machines and equipment alone and for wheel-type tractors alone, show the trend:

	1955	1956	1957	1958
Farm machines and wheel-type tractors	110	80	103	122
Farm machines	117	103	128	145
Wheel-type tractors	101	55	75	97

Air-Conditioned Combines

Air-conditioned cabs have been developed by company engineers for John Deere's Nos. 55 and 95 self-propelled combines, and have gone into use on the farm.

The cabs are carried on heavy steel frames, and are equipped with large full-view windows of tinted safety glass. Air pressure inside the sealed cabs is kept slightly above that outside, to prevent the seepage of outside air, laden with dust, pollen, and other irritants, into the cab.

Farmers will have three options when buying the cab—a combined heating and cooling year-round unit, a cooling unit only, or a heating unit only.

The compressor for the cooling system is belt-driven from the combine's engine. ■

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Circle 281 on Inquiry Card for more data

NEW PRODUCTION and PLANT EQUIPMENT

FOR ADDITIONAL INFORMATION, please use reply card at back of issue

Michigan Tool Co. gear checker for simplified precision setting, Model 1218A

Gear Checker Uses Built In Optics For Setting

PRECISION checking of the lead gears can be accomplished with the 1218A Checker, a lead-measuring instrument. The sine-bar controlled machine, although primarily designed for external helical gears and spur gears, also checks either right or left hand leads on herringbones or worms. The checking instrument has a capacity for gears up to 18 in. in diameter with shaft lengths to 24 in.

A built-in optical system is the basis for the set-up method. A 56x microscope with graduated eyepiece, providing an unreversed right-side-up image, is built in over the sine-bar table. Exact angle location is merely a matter of aligning cross-hair markings on the scope's eyepiece with the precision-graduated sine-bar plate. The scope and eyepiece divides a degree into 1000 parts. The sine-bar table is rotated manually from a handwheel to set the worm gear. The sine-bar plate is positively locked in position without the slightest deviation from the correct scope setting. *Michigan Tool Co.*

Circle 31 on postcard for more data

Pressure Gage

DESIGNATED as the Safe-T-Case gage, a newly designed pressure gage with a solid and integrally cast metal front plate is available from the American Chain & Cable Co., Inc.

Its gasketed and deformable back plate covers the entire rear of the unit and can be forced open by a minimum pressure of 3 psi. For added safety, in the event of a sudden high pressure surge, this back plate will not detach itself from the gage. The tube will take 50 per cent overpressure up to 10,000 psi and is suitable for oils, coke gas, kerosene, inert gases, dry chlorine, high pressure steam or any liquid or gas that will not corrode steel.

Circle 32 on postcard for more data

Bi-Directional Motor

THIS bi-directional digital motor and technically related rotary solenoid are being used to generate the intermittent movement for pulsed cameras and can be programmed by a tape to actuate many types of automatic equipment in the automation field.

Featuring a minimum number of parts for replacement and repair, the motor has specific applications in flight controls for missiles, as an actuator for automatic pilots, for automatic feeds in the machine tool industry and miscellaneous uses in computer accessories. *Curtiss-Wright Corp.*

Circle 33 on postcard for more data

Curtiss-Wright bi-directional motor

Chemical Process

SERSEAL No. 32 Process is for use with the Granodraw Process that produces oxalate coatings on stainless steel to facilitate drawing. Serseal No. 32 produces a di-phase bath, reduces normal loss of unstable chemicals usually found in this type of process while reducing normal heat requirements for the operation. *Amchem Products, Inc.*

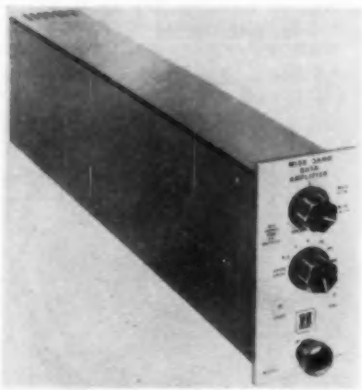
Circle 34 on postcard for more data

Direct Current Amplifiers

TWO direct current amplifiers, the AccuData 1 and 11, were designed for use in data-acquisition systems and feature isolated differential input which completely eliminates ground loop problems and increases resistance to unwanted voltages which could occur between input leads and ground.

The AccuData 1 combines two Honeywell second harmonic magnetic converters to provide ideal d-c transducer preamplifier characteristics and incorporates isolated differential input for strain gage, thermocouple and resistance bridge measurements. Its output is single-ended.

AccuData 11 embodies the added feature of being completely transistorized and designed for wide-band differential amplification, high frequency oscillograph and tape recorder applications. *Minneapolis Honeywell Regulator Co.*



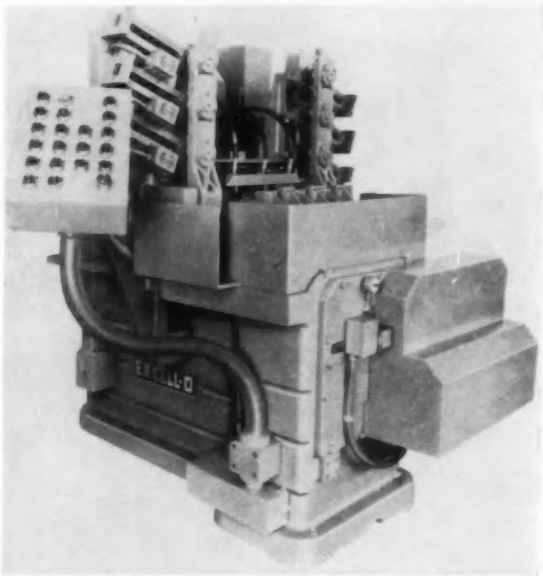
Honeywell AccuData 11 designed for use in data aquisition systems

Circle 35 on postcard for more data

FHP Speed Reducers

SW-1 speed reducers are available with aluminum driven worm gears of bearing type alloy. The complete fhp unit, with molded nylon fiberglass case and machined steel worm gear input shaft, weighs less than 21 oz. and measures 3¾ in. high by 3⅞ in. wide by 3⅛ in. deep. *Rampe Mfg. Co.*

Circle 37 on postcard for more data



Ex-Cell-O precision boring machine faces both ends of steel gear blanks. At the completion of machining, the table retracts and the unloading arm swings down, pulls the parts off the arbors and deposits them in the unloading chutes.

Boring Machine Faces Both Ends Of Steel Gear Blanks

THIS standard cam-operated precision boring machine faces both ends of steel gear blanks, chamfers both ID and OD and generates a radius on the hub faces. Automatic loading and unloading arms are provided which pick out and deposit the parts into special chutes.

Machine operations begin when fingers on the loading arm pick three parts from the loading chutes. The arm swings down and loads the parts on expanding arbors. After air-actuated clamping is complete, the arm returns, picks out three more parts and comes to rest in an upright position. At this point the machine table advances and number one tool chamfers the OD, faces the gear face, generates a radius and faces the gear hub. Tool number two then performs identical operations on the reverse side of the part, while tool three plunges a chamfer on the front ID. *Ex-Cell-O Corp.*

Circle 36 on postcard for more data

Work Center

AN all-steel, L-shaped unit with a total of over 27 sq-ft of surface divided between desk and board provides separate, easily accessible work areas in a minimum of space.

The drawing board drops to a completely horizontal position and the full 27½ sq-ft of work surface area is available as a table top for conference use. *Columbia-Hallowell Div., Standard Pressed Steel Corp.*

Circle 38 on postcard for more data

High-Speed Press

THE Elmes hydraulic press is a 500-ton unit designed for high-speed hot forging operations, for both open and closed die work. Bolster plates are fastened to the slide and press bed, with T-slots provided. Key ways are cut into bolsters to facilitate die alignment and to prevent misalignment of dies during forging operations. Long bronze bushed guides are used on the slide with full tonnage stops around the columns to prevent overstroking of the slide.

The press can be operated by either of two control levers, both serving the same function. One is at the press itself and one is at a remote location. The same lever controls are used to obtain short and rapid planishing strokes at full pressure. *American Steel Foundries, Elmes Engineering Div.*

Circle 39 on postcard for more data

Sciaky SWC-2X single phase control for resistance welders. The weld time circuit has been separated from sequence timing. The weld function is fail safe, because the termination of the weld time does not depend upon the initiation of conduction of an electronic tube. The weld timer is calibrated in one cycle steps; range is 1 to 60 cycles.

Single Phase Control For Resistance Welders

THE SWC-2X single phase resistance weld control is a rugged control designed to meet JIC standards which sequences the functions of resistance welders.

The control is composed of three basic parts; the timing panels, the firing panel, and the Ignition contactor panel. Transistors and printed circuits are used in the timing and firing panels. Electrical plug-in with four ¼ turn lock screw fasteners feature, provides quick and simple exchange of any timing on firing panel.

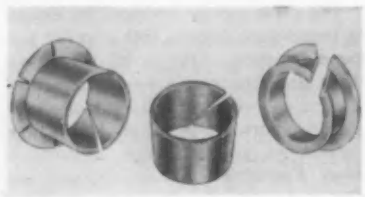
Control circuit is used to time and sequence a number of successive functions in resistance welder operation. All the control functions employ the same timing circuit to control the sequence of operation. *Sciaky Bros., Inc.*

Circle 40 on postcard for more data

Low Cost Nylon Bearings

SNAP-IN Nyliners are nylon bearings which are split to provide a compensation gap for the relatively large expansion and contraction of nylon. They can be compressed by hand and snapped into place. No press fitting is required after installation, and the bearings can be used without lubrication. This enables savings by the elimination of oil or grease fittings, lubricant passages, storage wells and seals. *Thomson Industries, Inc.*

Circle 41 on postcard for more data



Thomson Nyliner requires no lubrication

Recording Systems

SIX or eight interchangeable preamplifiers mounted in a single module in seven inches of panel space and a recorder-power amplifier-power supply package permit compactness in the Sanborn 850 series direct writing oscillographic recording systems. The 850's are suitable in applications of "medium sized" dc signals such as telemetry, analog computer readout, etc. A complete 850 system is housed in a single cabinet 60 in. high. *Sanborn Co.*

Circle 42 on postcard for more data

Cold Heading Machine

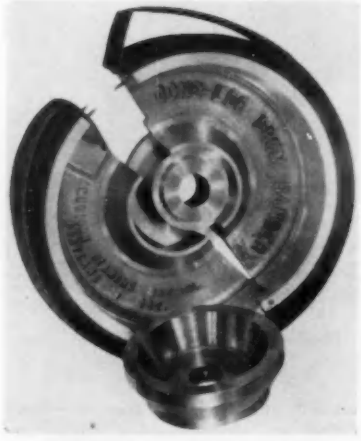
THE Omega "OO" cold-heading machine is designed primarily for quick and accurate cold-heading of miniature parts. Electrical contacts, rivets, pins and similar parts as small as 0.012 in. diameter by 0.016 in. long can be produced on this machine. It is a standard solid die, double stroke heading machine which will cut to length, head and form between 80 and 120 pieces per minute. The maximum wire diameter accommodated is 0.070 in. with most alloys and up to 0.120 in. with soft aluminum. Part lengths may range from 0.016 to 0.400 in. *The Robert E. Morris Co.*

Circle 43 on postcard for more data

Drum Sander For Tool Bits

HIGH-SPEED tool bits can be shaped by use of coated abrasive strips combined with the cushioning action of the Cone-Loc Drum Sander.

The sander uses inexpensive strips of coated abrasives for all types of grinding, polishing or de-burring operations and is available in 4, 6, 8, 10 and 12 in. diameters with standard rubber cushion. *American Diamond Saw Co.*



American Cone-Loc Drum Sander combined with a coated abrasive strip for shaping high-speed tool bits and other grinding, polishing or de-burring operations

Circle 44 on postcard for more data

METALS

Steel Operating Rate Is Expected To Average About 75 Per Cent During Fourth Quarter of the Year

By William F. Boericke

Steel Operating Rate Climbs

By mid-October the steel operating rate had climbed to 73 per cent of capacity, compared to the low point last April of about 48 per cent. It is confidently expected that the rate will continue to gain and could well average 75 per cent for the fourth quarter. Some mid-Western mills even now are operating at full capacity. Normally there should be some tapering off in December, but any lower operating rate at the year's end could become a base for a further upward movement in 1959.

Larger order backlogs are noted as incoming orders top shipments. This has tightened up some deliveries, particularly for cold rolled sheets. Thus far demand from Detroit has not been insistent but appliance manufacturers have called for increased tonnages. Galvanized sheets are in heavy demand, with some producers placing their salesmen on quotas, and delivery promises of six to eight weeks are usual. Oil country goods, long in a dull market, are showing signs of life and some inquiries have come from the railroads for rails, the first gain in more than a year. However, plate demand is still below normal. Tin plate is strong, as was expected when the price increase was announced for November 1. It appears that the can makers are starting to build up inventories against a possible strike in the steel industry next summer.

In spite of the growing tightness in flat-rolled products, there is little chance of a genuine shortage of any steel products. Capacity of the steel industry has been so much expanded that idle equipment could be implemented to fill much larger demand. With indicated present production rate of about 100 million tons, there is still a big gap between this and the industry's full capacity of over 140 million tons.

The automotive market is the key to a substantially higher operating rate for steel. Thus far the industry has made its recovery without much help from Detroit. If the new models win wide public acceptance, the automobile makers should buy steel heavily for production and to restore depleted inventories.

Stainless Steel Demand Improves Slowly

Stainless steel business has improved but the pace hasn't yet reached the headline stage. Orders from Detroit are still limited, but are expected to improve as automobile output picks up. Aircraft business is good. Alloy tubing, tool steel, and silicon sheets are still on the slow side.

Scrap Market in Doldrums

A disconcerting augury for steel is the lethargy of steel scrap. Historically regarded as a reliable barometer for activity in steel demand, the price of scrap continues to move sluggishly around the $44 level. Normally scrap prices move up when steel production is climbing, but through mid-October a softening trend was witnessed at the very time steel output was setting new highs for 1958. Various explanations are offered for this unusual action. Some mill men say that scrap inventories are still high and new purchases are restricted accordingly. Another belief is that the industry is able to substitute pig iron for some scrap in their open hearths because of extra blast furnace capacity now being utilized. One steel industry authority has declared that hot metal is generally favored over No. 1 heavy melting scrap in economies of blast furnace production.

Columbium for Steel Making

Great Lakes Steel Corp. has disclosed it is using Columbium as a key ingredient in a new high-strength line of steels. The added metal is partly responsible for the steel's ductility. It appears the new alloy will materially enlarge the markets for Columbium which has heretofore found limited applications. The metal occurs chiefly in conjunction with tantalum ores.

Copper Price Higher, Demand Good

The copper price was increased to 27½ cents a pound by mid-October with the chances that a further rise may be seen. The metal appears in definitely limited supply. In London spot copper sold close to 30 cents, up 50 per cent from its low earlier in the year. Work stoppages in Rhodesia, International Nickel in Canada, and at a Kennecott producer reduced estimated world output by over 50,000 tons a month and put a squeeze on sellers in London. However, at the same time, copper deliverable 90 days hence was quoted substantially lower. At the present time the N. Y. copper price is the lowest in the world and it becomes profitable to ship from U. S. abroad to the continent. Copper scrap prices have advanced, with dealers unwilling to sell. Sales outside U. S. were reported to be the highest for a year. Both Kennecott and Phelps Dodge increased their work week at their western mines.

There seems to be reasons for be-

(*Turn to page* 86, *please*)

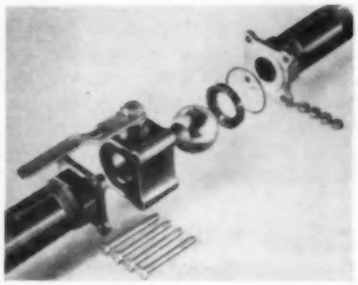
NEW PRODUCTS
AUTOMOTIVE-AVIATION

FOR ADDITIONAL INFORMATION, please use reply card at back of issue

Straight-Through Valves

A series of vacuum leak-tested, straight-through ball valves which make good roughing and forepressure valve controls are being offered by Consolidated electrodynamics Corp.

Serving as both valve and union, the unit eliminates the need for a separate union and minimizes the time spent in installation. Because of



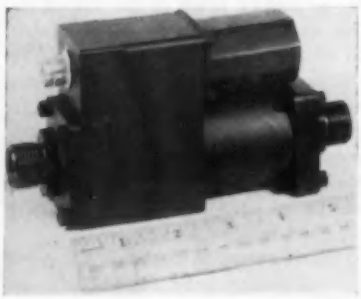
its three-piece construction, the valve center can be removed without disturbing the union ends.

Designated Series VB, the valves are available in ½, ¾, 1, 1½, and 2 in. sizes. They may be installed by NPT pipe connections or by sweat-soldering.

Circle 60 on postcard for more data

Aircraft Mass Flowmeter

A miniaturized aircraft mass flowmeter system will provide a continuous indication of the mass rate of fuel flow up to 5000 lb per hour. Designated Type TJ-61, it is designed for use on small jet and turbo-prop engines.



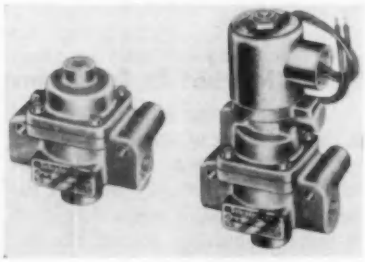
A self-contained frequency compensator in the self-synchronous system permits operation from 400 cycle, 115 v ship's power which does not have close frequency control. No external power is needed, even for applications in which a controlled frequency power source is unavailable. *General Electric Co.*

Circle 61 on postcard for more data

Interchangeable Valves

A three-way solenoid valve and three-way pilot valve, both using the same type base and consisting of the same operating parts, have been introduced by A. Schrader's Son, Div. Scovill Mfg. Co.

Fast interchangeability and a minimum requirement for spare parts results from these features. The pilot valve can be converted to a solenoid type by replacing the pilot chamber with the solenoid head, and vice-versa. Another advantage is the conversion of either the pilot or solenoid



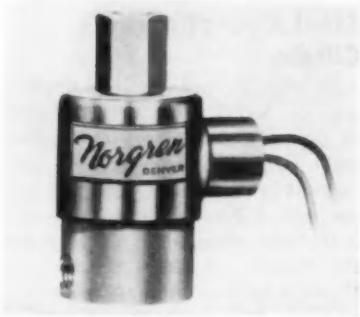
from a normally open type valve to a normally closed type valve, and vice-versa, by shifting the pilot or solenoid chamber head 90 degrees.

Circle 62 on postcard for more data

Solenoid Controls

Two-way and three-way solenoid valves, made by the C. A. Norgren Co., incorporate design and construction features that provide a valve with good flow, high operating pressure, long life and ease of maintenance.

The series is available in ⅛ and ¼ in. pipe sizes, including 2-way, 3-



way and directional solenoid valves in both normally open and normally closed types.

Circle 63 on postcard for more data

Data Storage Tube

A three inch storage tube (WL-7225) has been designed for storing information in computers. The tube receives information in the form of electrical impulses, stores it, and when signaled to do so, reads back electrically the accumulated data.

Features of the tube include: 2.6 in. diameter of useful target; increased resolution; electron gun beam focusing to a fine spot; convenient coaxial connector for the output terminations. *Westinghouse Electric Corp.*

Circle 64 on postcard for more data

Aluminum-Steel Cable

Lockclad aluminum covered steel cable consists of aluminum tubing compressed over steel cable to modify the effective coefficient of thermal expansion and stretch of cable for aircraft applications.

These cables can be used in pressure cabin aircraft where the cable must pass through pressure seals, and where water pressure seals are involved, because of their smooth, void-free surface. *Bergen Wire Rope Co.*

Circle 65 on postcard for more data

Metalized Tape

Trimbrite self-sticking metalized Mylar Tape is for trimming cabinets, appliances, cars, boats and trailers. It resists rust, abrasions and stains; it is also tarnish and fade proof and will not crack or peel. Trimbrite comes in gold, chrome and copper colors and in cross hatch, brush and flute small box patterns. *Marglo, Inc.*

Circle 66 on postcard for more data

Rocket Thrust Controller

This hydromechanical controller, capable of sensing and correcting small errors in thrust chamber pressure in liquid propellant rocket engines by producing a rate of change in actuator position, has been developed by Bendix.

The actuator, an integral part of the control, can be used to govern the flow of propellant to a gas generator or the flow of hot gas from the generator to the turbine, thereby controlling turbine speed and propellant flow to the main rocket thrust chamber.

The controller has a two-stage pressure regulator for obtaining an accurate reference, a high-gain pres-

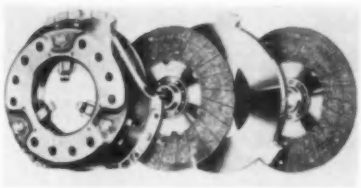
sure error sensing diaphragm, and a two-stage hydraulic amplifier. Accuracy and load insensitivity are obtained by servomechanism techniques such as degenerative actuator velocity feedback. *Bendix Products Div., Bendix Aviation Corp.*

Circle 67 on postcard for more data

Two-Plate Clutch

This 12 in. two plate DPB direct pressure heavy duty clutch is designed for truck, tractor, bus and industrial use. The unit, with single plate cover, possesses high burst strength and torque with low pedal pressure.

Friction free internal linkage permits mechanical efficiency. The clutch has an intermediate plate of rugged close grain high tensile iron that resists warpage. Center plate is lug-type, providing more driving area. Drive mechanism is simplified assuring more alignment between plate



and engine flywheel. Driving pin alignment is eliminated. *Lipe-Rollway Corp.*

Circle 68 on postcard for more data

Mechanical Seals

A shaft sealing device used to replace the packing in a conventional centrifugal pump stuffing box, or the gland of a rotating shaft eliminates the periodic downtime for re-packing. Using precision-lapped faces, it is designed to withstand extreme conditions of temperature and pressure without leakage. *The Borg-Warner Corp.*

Circle 69 on postcard for more data

Data-Logging Film

A tough, durable data-logging film has been added to an expanding line of photorecording materials. The film, Cronar Recording Film, was developed for oscillographic recording use in aircraft, automotive and rocket-satellite testing. *E. I. duPont de Nemours & Co.*

Circle 70 on postcard for more data

Aircraft Fastener

Aircraft Huckbolt fasteners can be installed with standard bench tools. The wrench-installed configuration was developed to meet the specific requirements of aircraft applications where assembly interference problems preclude the use of Huck installation tools. It provides the same pull-together, tensile pre-load, uniformity of installation obtained with power-tool installed fasteners.

Fabricated of alloy steel, the fastener is available with either protruding or flush head designs in either tension or shear aircraft type. *Huck Mfg. Co.*

Circle 71 on postcard for more data

Rubber-Like Adhesives

A family of rubber-like adhesives that bond nearly any surface to itself or to another is announced by B. F. Goodrich Industrial Products Co.

The material is described as a polymer with built-in adhesive characteristics, and is available as a laminating adhesive. Designated A-916-B, the pressure-sensitive thermoplastic material bonds synthetic films to all kinds of metals as well as to paper, wood, glass, plaster or other materials—without heat or special surface treatment.

It is virtually colorless and transparent but can be furnished in any color. It can be applied by brush or roller-coated, knife-coated or modified for spray, and has good storage stability.

Circle 72 on postcard for more data

Liquid Oxygen Converter

The 10-liter converter shown here can supply enough oxygen to sustain two men at altitudes above 35,000 ft for a period of 24 hours. The 10 liters of liquid oxygen convert to 8610 liters

(304 cu-ft) of gaseous oxygen, which can be delivered at rates up to 150 liters per minute at an operating pressure of 70 psi. *Linde Co., Div. of Union Carbide Corp.*

Circle 73 on postcard for more data

AUTOMOTIVE INDUSTRIES . . .

Is your News Magazine of Automotive and Aviation

MANUFACTURING

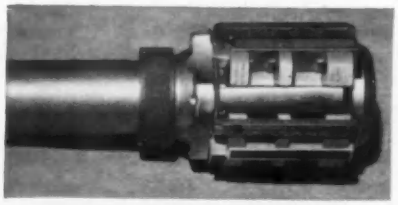
WHY MICROHONING* TOOLS ASSURE

ECONOMY — PRECISION — PRODUCTION

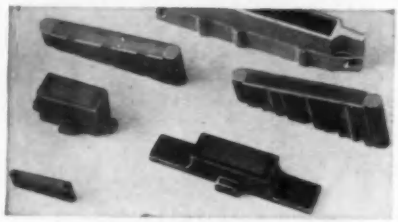
COST FACTORS (labor, maintenance, scrapped parts, productivity, etc.) DETERMINE MACHINE TOOL EFFICIENCY.

To Minimize These Cost Factors, Micromatic has developed Microhoning tools that offer a new concept in metalworking. This concept (known as the Microhoning process) assures controlled abrading, efficient stock removal, accurate generation of geometry and size, and produces uniform, functional surface finishes.

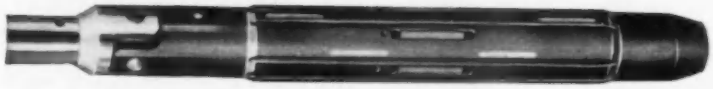
Because Microhoning removes inaccuracies of preceding operations, it is usually the final stock removal operation. Therefore, Microhoning tools are designed and applied to produce high precision, assure a minimum of scrap and protect the user's investment in previous processing operations.



New! Tru-Float tool has a universal joint within the abrading unit. This design provides maximum accuracy and float, uniform abrading and surface finish, less wear of abrasives, retention of original bore location, and minimum stock removal to correct inaccuracies.



Micromold assemblies have plastic or soft metal shells that minimize tool wear and protect the edges of abrasive sticks from the harsh dressing action of extremely rough bores. This abrasive stick design eliminates many parts previously required to hold abrasives and expand the tool.



Tool designed for Microhoning tandem bores has plastic guides between banks of abrasives to stabilize the tool as it passes over bore interruptions.

Because use of the proper tool is so important, Micromatic designs Microhoning tools to suit the individual work piece, and integrates tool design with machine and fixturing to provide the ultimate in operating efficiency.

*Registered U.S. Pat. Off.

MICROMATIC HONE CORP.

8100 SCHOOLCRAFT AVENUE · DETROIT 38, MICHIGAN

British Truck and Bus Industry

(*Continued from page* 57)

normal-control trucks with 12 models ranging from 1½ to 8 tons payload. Powered by gasoline or Diesel engines, they have a redesigned chassis with 16-in. wheels giving a lower loading height. It is claimed that Bedford now leads world truck sales in Britain and twelve overseas countries.

Ford has consolidated its position in the field with the success of its Thames Traders brought out last year, and has now produced a 12-seater microbus version of the ¾-ton panel van based on Consul chassis components.

Also extending its range is the Rootes Group, which displayed several new vehicles at the show. Noteworthy among these were three Commer forward-control chassis of 4, 5 and 6 tons powered by the Perkins flat under-floor engine (see A. I., Oct. 1, page 38) designed for these applications. The six-cylinder C.305 Diesel of 305.3-cu in. volume develops 87 hp at 2400 rpm, and compactness is increased by the use of a high-level camshaft with mushroom-type tappets, making pushrods unnecessary. This unit is also employed in the Karrier ¾-ton Gamecock.

Standard Enters Truck Field

Standard has made its first serious entry into the commercial arena with its Atlas half-ton truck available as panel van or pickup. Using its existing 37-hp car engine, Standard is the first British bidder in the market for low-power high-capacity vehicles where Volkswagen and other European manufacturers have long reigned supreme. The chassis is in two parts, with the engine, gearbox, suspension and steering assemblies carried on the front frame section that is easily detachable as a unit for servicing.

Front springing consists of a transverse leaf centrally positioned by eyes spaced 12 in. apart. Linkage to the swivel axles is such that

when one wheel rises over a bump or during cornering, the center section of the spring moves downward with the effect of lifting the other end. The resultant increased roll stiffness offsets the lessened resistance by the narrow front tread, which is purposely reduced to 3 ft 9 in. to give a tight turning circle. Forward-control cabs are used on both models, and the 180-cu ft van body is available with special sliding doors that close flush with the outside panels.

Rover has combined existing units to present what is believed to be the world's first fire engine with four-wheel drive and turbine-powered pump. Based on a short-wheel base Land Rover with normal fire equipment, is uses the 60-hp gas turbine to run a 500-gpm pump.

Seen for the first time was the latest Austin taxi featuring a new 5-passenger body with enclosed luggage compartment next to the driver, 55-hp B. M. C. Diesel engine, and Borg Warner automatic transmission.

MACHINERY NEWS

(*Continued from page* 70)

Dr. Rader adds, "Renewal parts are no longer a problem since production knowledge is now stored in punched tape. Reduction in lead time on both standard and prototype parts, a decrease in scrap losses, and elimination of excess cost and rework due to errors will pay for the machine and control." He estimated the numerically - controlled drilling equipment will pay for itself in savings in about two years and "60 per cent of this is directly attributable to reduction of special tools."

The six-spindle drill takes punched tape "commands" from the Mark II control package. A tape reader in the control system reads the tape, sends signals to the drill, checks the motion of the machine within prescribed limits, and—when the machine has been properly positioned — "instructs" the machine to drill into the part.

(*Turn to page* 84, *please*)

HOW MICROHONING* TOOLS PROVIDE

ECONOMY—PRECISION—PRODUCTION

When a precision stock removal process minimizes cost factors (labor, maintenance, scrapped parts, etc.) then volume production at lower cost per piece is possible. Here's how the distinctive design and performance of Microhoning tools provide all three—economy, precision and production.

EFFICIENT OPERATION

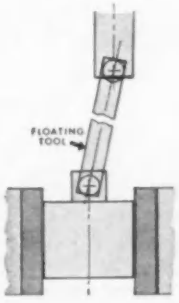
Micromatic expands, rotates and reciprocates the abrading tool in the bore. Through this controlled combination of pressure and movements, abrasives are self-dressing for effective and continuous cutting action. Long abrasive sticks are evenly spaced around the tool to keep it stable. They effectively bridge surface irregularities and generate a geometrically true cylinder.

REDUCES OPERATOR COSTS

Micromatic. "Adjusting Heads" give operator complete and positive control of tool expansion. Or, automatic controls can be used to perform all tool adjustment and gaging. They assure accurate duplication in every part produced.

MINIMUM MAINTENANCE

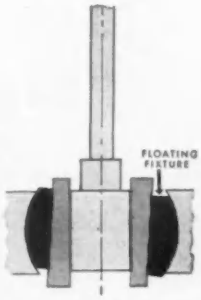
Micromatic tools are designed for durability, especially at all stress points and joints. Plastic or soft metal holders prolong abrasive life, greatly reduce tool wear.



MAINTAINS ORIGINAL BORE LOCATION

Micromatic either floats the tool or the work holding fixture so tool and work piece can automatically align themselves. This assures cutting-unit rotation coincides with neutral axis of bore.

WRITE FOR LITERATURE



Micromatic produces tools best suited to the production of individual work pieces. And properly integrates the tool with machine and fixturing for peak productivity at lowest cost per piece produced.

**Registered U.S. Pat. Off.*

MICROMATIC HONE CORP.

8100 SCHOOLCRAFT AVENUE · DETROIT 38, MICHIGAN

Observations

By Joseph Geschelin

Free Piston

An excellent capsule review of the literature and background of the free piston engine is found in the September, 1958 issue of *Lubrication* (The Texas Co.). In addition, this brochure touches on cycles, machine design, and fuels. It is timely and of wide general interest.

Light Weight

More aluminum — both functional and decorative—will be used in 1959 cars. We have not yet completed an industry-wide survey but Chevrolet mentioned that their cars would have four pounds more of aluminum, on the average. GMC, in announcing two extra-heavy duty tractor models, indicated that both would employ all-aluminum cabs, thereby increasing payload capacity.

Frills Gone

The entire motor car industry reacted sharply to the gratuitous criticism that gathered during the course of the 1958 model year. All makes invariably have reduced the glitter and decoration in favor of bright accent only at points where highlights are indicated. The result is noteworthy and very pleasing.

--a sweet running job

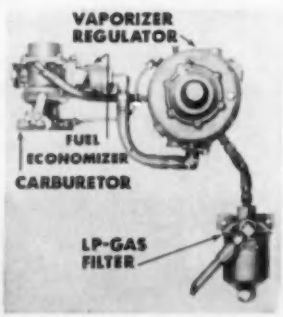
Minneapolis-Moline LP-Gas Powered Tractor Model 445.

--OEM* EQUIPPED WITH ENSIGN

Here again is another fine example of tractor engineering in which top-notch performance on LP-Gas assures the farmer of unprecedented economies in fuel and engine maintenance. We are proud indeed to have our LP-Gas carburetors included as original equipment on Minneapolis-Moline tractors.

As the leading manufacturer of LP-Gas carburetion, we are constantly in search of better methods and materials to give added years of economical engine operation on tractors equipped with Ensign. We have gained valuable experience in this field and are most happy to share it with you. Write us for recommendations on your carburetor needs. Ensign dealers and representatives cover the nation. Insist on Ensign—accept nothing less!

*OEM *means "Original Equipment Manufacturer." It means that the manufacturer of this tractor has chosen Ensign carburetion as standard equipment.*



ENSIGN CARBURETOR COMPANY

1551 E. Orangethorpe, Fullerton, California
Branch Factory: 2330 W. 58th Street, Chicago, Illinois

MACHINERY NEWS

(*Continued from page* 83)

This sequence is automatically repeated until all holes in the workpiece have been drilled. At the end of the cycle an audible signal is set off to alert the operator of run completion.

The Mark II packaged unit consists of the main control cabinet, an operator's station, punched-tape reader, two Thymotrol adjustable-speed drives, and two position pickup units.

EXECUTIVES READ
AUTOMOTIVE INDUSTRIES

THIS SEAT'S TAKEN...

in one easy turn!

Conceived, designed and produced by Rockwell-Standard Corporation, the remarkable new Swivel Seat* is available on some of America's finest 1959 model cars. It's another important seating development for the automotive industry from Rockwell-Standard Corporation.

*Patents Pending

ROCKWELL R STANDARD

©1958, R-S Corp.

ROCKWELL - STANDARD
CORPORATION
General Offices: Coraopolis, Pennsylvania

MURRAY-WAY ROLLER COATERS

give you BETTER, FASTER, CHEAPER PRODUCTION COATING with COMPOUNDS, WAXES, SEALERS, RUST-PROOFERS, PAINTS or VARNISHES

MODEL C

Budget priced. Ideal for automated production lines. Gives one or both sides application of adjustable thickness coatings. Conveyors are optional. Simple design. Sturdy welded steel construction.

MODEL G

A top quality, high production coater. Produces vernier adjusted coatings one or both sides of coil, sheet or blanked material. Upper and lower rolls independently driven. Hinged construction affords fast access to rolls without disturbing drive adjustments. Shielded drive and bearings.

Murray-Way Roller Coaters are compact in design, built for toughest production jobs and will save their price many times in faster, low cost, uniform high quality production.

There is a standard Murray-Way Roller Coater model to fill most every requirement. Our engineering specialists will produce custom models for unusual applications.

Specialists in automatic metal finishing and materials handling equipment and systems.

MURRAY-WAY CORPORATION

P. O. BOX 180, MAPLE ROAD EAST · BIRMINGHAM, MICH.

Circle 285 on Inquiry Card for more data

METALS

(*Continued from page* 79)

lief that the copper price rise will halt, temporarily at least, short of 30 cents a pound. Strikes don't last indefinitely, and increased output can be expected from mines that have cut back when prices were lower and conditions less hopeful. At a price higher than 30 cents the threat of aluminums substitution looms strong and consumers will probably register strong protest against prices that prevailed in 1956-7. Producers are fully aware of this attitude and don't want to see a runaway market and a recurrence of the disastrous slump that followed 46 cent copper.

Aluminum Producers Increase Output

After having cut back to about 70 per cent of capacity, the aluminum producers are upping output. Reynolds and Kaiser have stepped up production to about 84 per cent capacity and Alcoa has begun production at a new potline at Massena and is reactivating another line. By the end of October it is expected that the operational level will be up to 1,728,000 tons per year or about 83 per cent of the potential of 2,100,000 tons. Improving demand is the answer.

Nevertheless immediate prospects are clouded. Over-expansion in capacity with new facilities yet to come on stream, hidden stocks held by fabricating branches of the primary firms, disappearance of puts to the Government, and potential Russian competition all cause some misgivings. Russian aluminum is quoted about 21¼ cents on the continent, more than three cents less than the domestic price pig.

Zinc Price Advanced

Breaking away from its long price stalemate, in two swift moves zinc was raised a full cent a pound from the 10 cent price that has held unchanged since July, 1957. It was by no means certain that the metal would remain at this level before rising higher. Zinc sales have been extremely high in the first half of

(*Turn to page* 92, *please*)

AUTOMATION NEWS REPORT

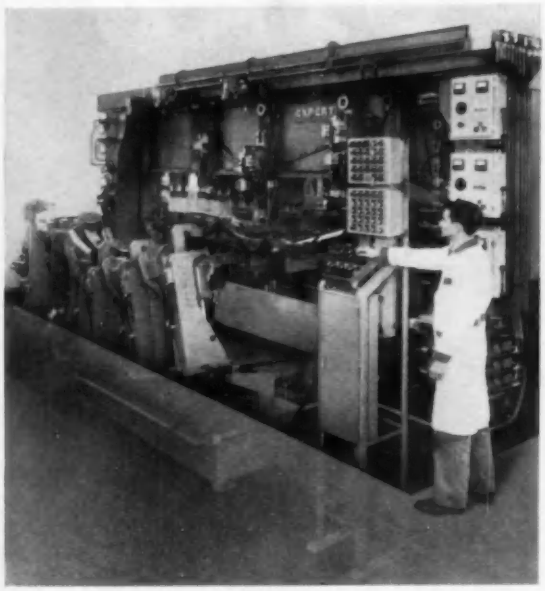
(*Continued from page 72*)

Each welding head is supported by a carriage driven by a separate motor and guided by cam rollers. These rollers follow the basic part contour cams which are made to print dimensions.

The welding system operates as follows: the basic welding carriage follows the design weld contour line, while a mechanical probe mounted on a slide on the carriage follows the actual weld contour line.

The movements of the slides are transmitted to a differential, whose output is the error between the actual and the design weld line. This error is recorded on a loop of magnetic tape, where it is picked up by a reading head and fed through an amplifier and hydraulic valve to a hydraulic servo cylinder. The servo cylinder then positions the welding head on its carriage to correct for the error.

Expert has built machines with this control system for welding the two channel halves of right and left hand automotive frame siderails (see illustration) and automotive frame crossmembers.



Expert welding machine automatically welds contours of automobile frame siderails. A phantom floor has been drawn in to show how the machine is installed in the plant. The machine sits in a pit about 30-in. deep.

INDUSTRIAL ELECTRONICS CONFERENCE

Two postwar advances—the systems engineering concept and automatic data processing—were responsible for sparking the wave of automation techniques in the U. S., according to Dr. Irvin Travis, Burroughs Corp.

Speaking at a conference on industrial electronics in Detroit, Dr. Travis said that automation has three major objectives—to make better products; to increase output per worker; and to do things that couldn't be done without it.

Dr. Travis took sharp issue with the notion that automation has created unemployment. He conceded that the introduction of automation techniques caused a temporary displacement in some cases, but the total effect, he said, was to increase employment.

Automation does change job classifications and may obsolete many jobs and certain kinds of skills, he added, but these will be replaced by newer skills in higher earning classifications.

An automatic hardness tester with electronic measuring and computing circuits was described to the conference by R. B. Allured,

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process development staff, GMC.

The tester uses standard Rockwell indenters to check hardness and sort parts on the production line. The indenter is forced into the surface of the part and the force is measured electronically, according to an established force-hardness relationship. Hardness measurement as well as classification take only a fraction of a second, Mr. Allured said, and inspection rates up to 3000 per hour are predicted.

Testing procedures on missile components are so exacting and time consuming that automatic means are needed to reduce cost and to facilitate inspection.

This was the thesis developed by Joseph Tampico and Harold B. Rose, Pamona Div., Marquardt Aircraft Co., in describing modular automation equipment techniques. They cited one example where manual inspection of a part took four hours compared with 0.7 hours using electronic equipment.

Use of automatic test sets composed of functional modules permits rapid and economical servicing, they pointed out, and cuts down on obsolescence. Another advantage claimed for the modular approach is that it allows test sets with a low order of automation to use the same modules as the fully automated types.

Operation of safety devices for a high-speed bearing and shaft-seal testing machine was outlined by M. E. Fitch, Scientific Laboratory, Ford Motor Co.

The machine consists of an air turbine driving the load through a flexible quill shaft. It operates in the range of 10,000 to 110,000 rpm. The safety devices interrupt the turbine air supply when either a predetermined torque or preset speed is exceeded. Magnetic pick-up signals generated by magnetic pins on the rotating shaft work the safety devices.

An electrical shutoff signal is developed during the first revolution of overtorque or overspeed. These safety devices must be fail-safe and operate in about 27-ms to prevent damage to the turbine.

The conference was sponsored by the IRE and AIEE. ■

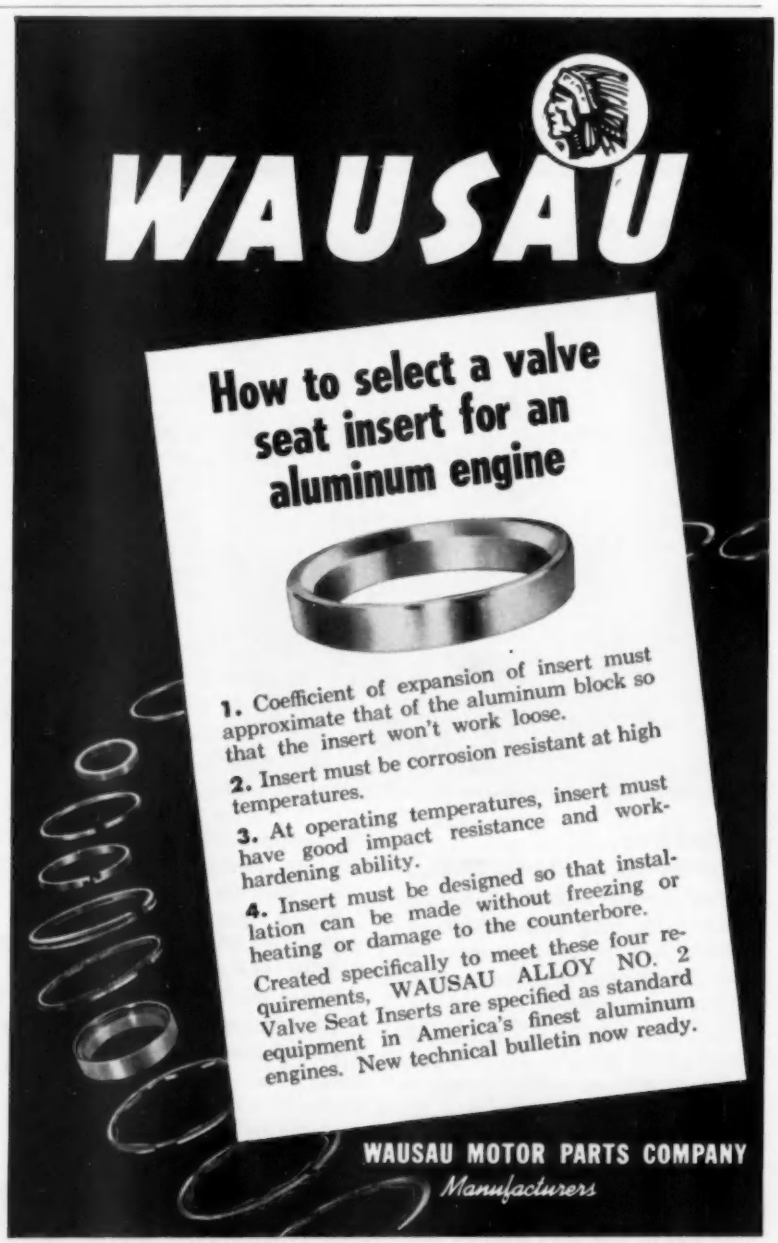
1959 Edsel

(*Continued from page* 63)

A choice of three transmissions is offered this year: the economy Mile-O-Matic, which features aluminum in its construction, weighing 50 lb less than the conventional automatic transmission; a three-speed synchromesh transmission; and the dual-range Select-O-Matic automatic transmission, in combination only with the 361-cu-in. V-8.

Numerous mechanical changes have been incorporated in the 1959 line. The chassis frame is of the ladder type. For convertibles, the frame has a heavy X-member of I-beam section. At the body shell section the frame is widened to follow the outer contour of rocker panels so as to provide for maximum space within the passenger compartment.

Front suspension is of short-long arm design with the leading edge tilted three deg. upward, while the


WAUSAU
How to select a valve seat insert for an aluminum engine
1. Coefficient of expansion of insert must approximate that of the aluminum block so that the insert won't work loose.
2. Insert must be corrosion resistant at high temperatures.
3. At operating temperatures, insert must have good impact resistance and work-hardening ability.
4. Insert must be designed so that installation can be made without freezing or heating or damage to the counterbore.
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lower arm is swept back 20 deg to allow for proper wheel precession. Lower suspension arms are mounted in rubber bushings, while upper suspension arms are mounted to the top of the frame on permanently lubricated threaded bushings. Spindles are mounted on ball joints riveted to the outboard ends of the suspension arms. A Teflon thrust washes serves to control friction at the correct level for proper steering and wheel fight damping.

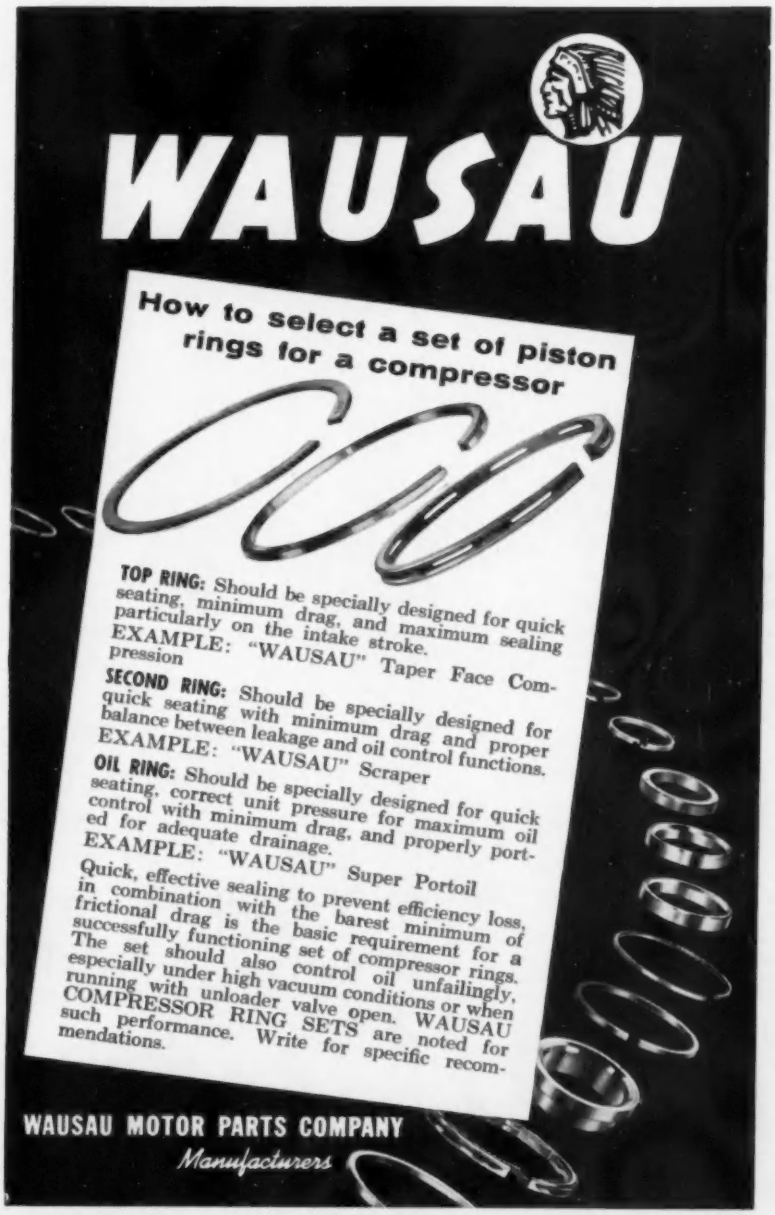
Rear suspension has been redesigned importantly, employs a longer—58 by 2½ in.—leaf spring with four leaves. Springs are of variable rate, with the stiffer short section at the front and a longer, lower rate section at the rear. They are insulated from the frame by rubber bushings. For station wagons Edsel employs a tension shackle at the rear to provide the higher rate build-up which is more suitable for multi-purpose vehicles. Leaf spring friction is reduced by inserting four wax-impregnated fabric tip liners in each spring.

The manual steering gear is of recirculating ball and nut type. Where power steering is specified, Edsel supplies a linkage type power steering assist, consisting of a large displacement cylinder, control valve, pump and reservoir assembly. Since these components are added to the standard steering system, the installation can be made either at the factory or in the field.

Self-adjusting service brakes are continued. Power brake installation has been simplified by using the standard brake pedal and simply adding the compact, Treadle-vac unit which contains linkage for attachment.

Engine specifications appear in tabular form. It may be noted that both the 332- and 361-cu-in. engines employ full flow oil filters of disposable can type. Two-barrel carburetors are used on the 292- and 332-cu-in. engines; a four-barrel carburetor being used on the 361-cu-in. engine. Both are of similar basic design. Throttle operation has been designed to provide more positive stroke control by minimizing stack-up variations in the accelerator pump stroke. A vacuum-regulated choke plate of latest design is used in all carburetors. Vacuum causes the plate to open and supply the proper amount of air for initial starts and running. The thermostatically-controlled choke valve then takes over. High speed bleed holes are located outside the carburetor air horn area to prevent flooding during initial cold starting.

Electrical wiring has been simplified and improved by the use of plug-in bulkhead connectors, which tidies up the engine compartment and under the instrument panel on the left side. Removal of the push-button transmission control from the steering wheel hub has also helped to simplify the wiring. This permitted the removal of the park relay, transmission control relay, transmission shift motor, inhibitor switch and circuit breaker. The steering column was simplified by the removal of the slip rings and column wiring. ■


WAUSAU
How to select a set of piston rings for a compressor
TOP RING: Should be specially designed for quick seating, minimum drag, and maximum sealing particularly on the intake stroke.
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SECOND RING: Should be specially designed for quick seating with minimum drag and proper balance between leakage and oil control functions.
EXAMPLE: "WAUSAU" Scraper
OIL RING: Should be specially designed for quick seating, correct unit pressure for maximum oil control with minimum drag, and properly ported for adequate drainage.
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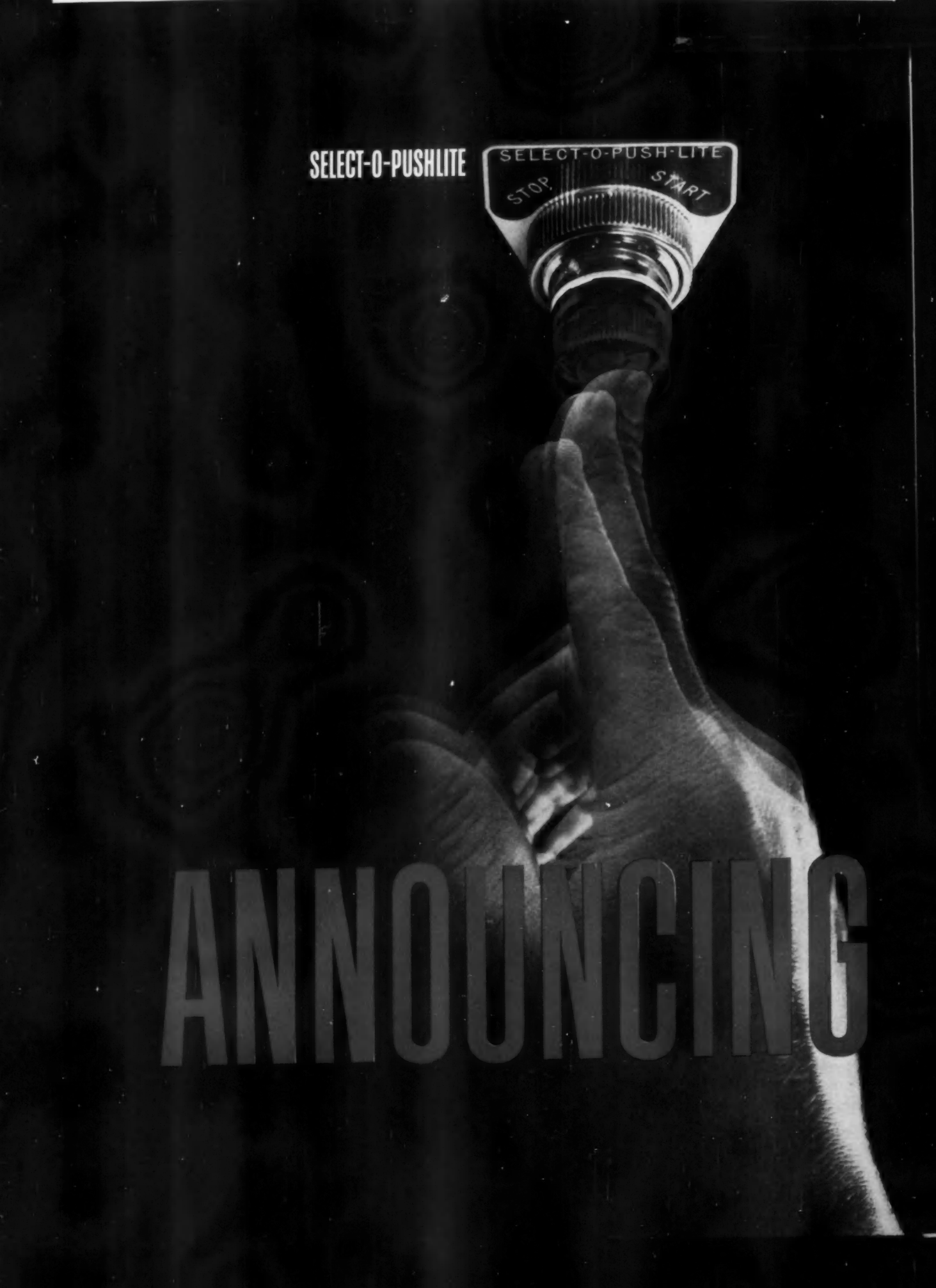
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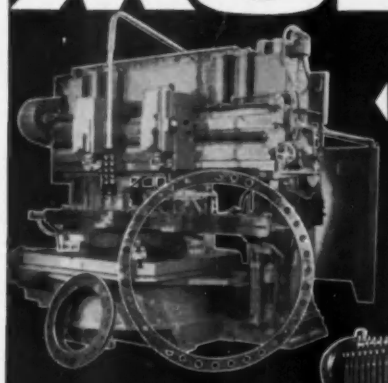
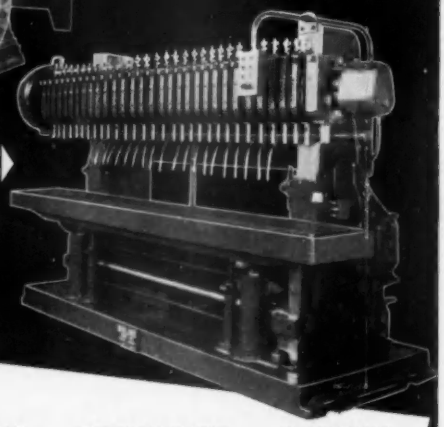


HD68 drills bolt circles from 12" to 100" diameter. Each of the two spindles has capacity for 2½" drill in steel. Operating cycle is fully automatic.

HD13 straight line-type drilling machine with capacity for thirty ¾" drills in steel. Used for work on heavy castings, round and rectangular steel tubes, structural shapes, plates and grader blade drilling or countersinking.



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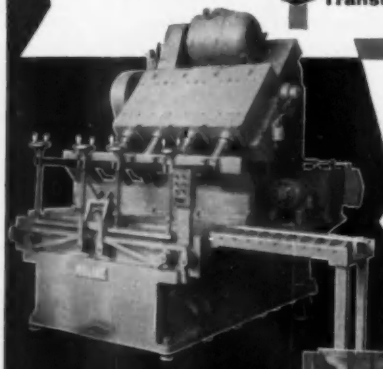

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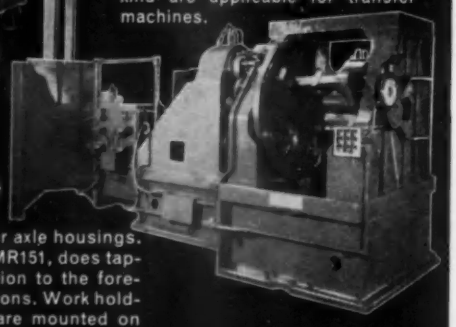
13CB hydraulic feed cylinder boring machine. V-8 engine blocks are rough and finish bored for wet-type cylinder sleeves. Units of this kind are applicable for transfer machines.



MR152 performs drilling, reaming, spot facing and chamfering operations on tractor rear axle housings. A companion machine, MR151, does tapping in addition to the foregoing operations. Work holding fixtures are mounted on power driven trunnion.

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109

(*Continued from page* 86)

October, with weekly figures as much as the total of a whole month earlier in the year, giving convincing evidence that consumers inventories were extremely low.

Lead Higher

In quite as spectacular a manner as exhibited by zinc, the lead price was pushed up from 10¾ cents to 13 cents a pound by mid-October, with much the same reasons ascribed as for the sister metal. It seems possible that higher prices may be seen as the smelters accumulate most of their supplies when lead was selling at 13 cents a pound. The strong market with weekly sales reported the largest in several years was aided by the embargo placed in Mexico on all exports of both lead and zinc, until allocation of reduced production and exports can be determined.

SHORTIES

Octane improvement represents conservation of 1½ billion barrels of petroleum per year.

•

A typical jet plane costs more than a stack of dollar bills as high as the Washington Monument (555 ft); A typical missile cost more per lb than platinum.

•

A long-range turbo-jet airliner will consume 150,000 barrels of petroleum fuel a year—the equivalent in volume of the gasoline sold by about thirty service stations.

•

Railroads were the biggest users of diesel fuels in 1956, consuming more than 46 per cent of the more than 180 million barrels sold in the country.

DU PONT

AUTOMOTIVE ENGINEERING NEWS

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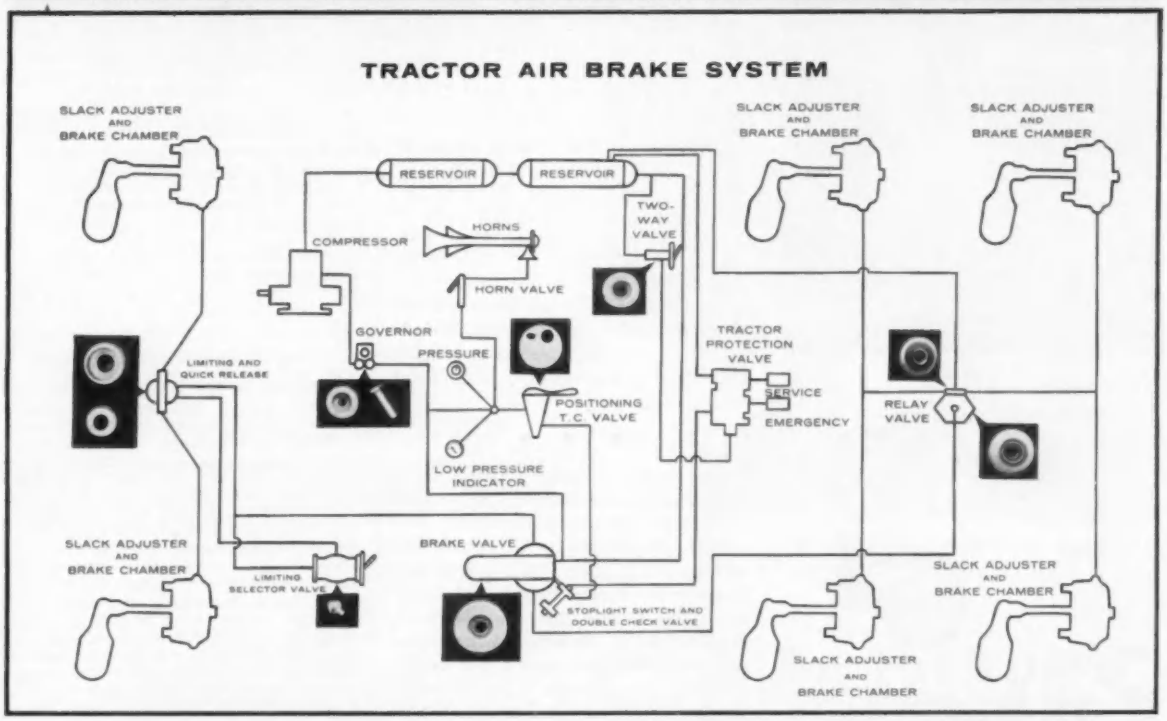
NYLON RESINS



Pneumatic system for tractor uses ZYTEL® for sealing, wear resistance, high performance

Bendix-Westinghouse pneumatic systems are designed better and provide longer life with parts of Du Pont ZYTEL nylon resin. Their use in a tractor is diagramed above. Numerous parts of ZYTEL are also used in trailer air brake and suspension systems designed by the same company.

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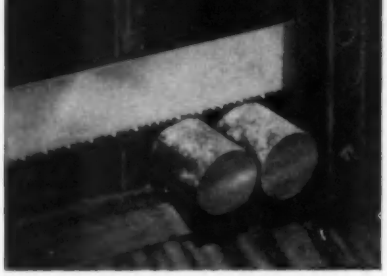

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ON OUR WASHINGTON WIRE

Defense Secretary Neil McElroy serves notice that he doesn't plan to be pressured into pouring money into untried missile programs. The U.S., he says confidently, is ahead of the Russians in overall might. It is his judgment and the judgment of the Joint Chiefs of Staff that the nation can prevent attack by keeping on the alert with enough power to devastate an aggressor. This country has that power today, according to Mr. McElroy.

• • •

Flight of Pioneer rocket has given scientists better idea as to radiation belt around earth. This moon rocket failed to reach the moon, but it seems to confirm this theory: Radiation falls in intensity as highest altitudes are reached. At 5,000 miles, estimated roentgen intake of Pioneer was 4 per hr. At 10,000 miles it was 3 per hr, and dropping. Atomic Energy Commission considers only 3/10 roentgen per week a safe human dosage.

• • •

It's now decided that the next defense budget will call for total spending of about $42 billion. The overall total will be somewhat more than $1 billion over the current figure. Chief reason for the increase: More and costlier missiles. Secondary reason: Inflation.

• • •

The U. S. will have a man orbiting in space within three years, top scientists say. Program to put a man into an orbiting space capsule for about 24 hours before being returned to earth is already underway. When success is achieved, the experiment will be repeated several times, space officials say. Some $40 million will be spent on the project this year. The manned capsule would make 10 to 12 orbits of the earth in 24 hours.

STATEMENT REQUIRED BY THE ACT OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946 (Title 39, United States Code, Section 233) SHOWING THE OWNERSHIP, MANAGEMENT, AND CIRCULATION OF AUTOMOTIVE INDUSTRIES, published semi-monthly at Philadelphia 39, Pa., for October 1, 1958.

1. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, John C. Hildreth, Jr., 301 Pugh Road, Devon, Pa. Editor, James R. Custer, 303 Hampden Road, Upper Darby, Pa. Managing editor, Harry Roberts, 110 Cornell Avenue, Swarthmore, Pa. Business manager, John C. Hildreth, Jr., 301 Pugh Road, Devon, Pa.

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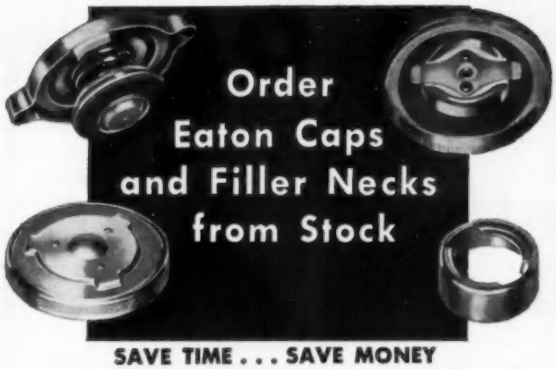
5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: (This information is required from daily, weekly, semiweekly, and triweekly newspapers only.)

JOHN C. HILDRETH, JR.
Publisher

Sworn to and subscribed before me this 17th day of September, 1958.

PHILIP J. SHIRE, JR.

(My commission expires January 7, 1959)
[Seal]



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FREE LITERATURE

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Bulletin GEA-6831, two pages, describes high-power dc servo motors designed for fast response to control signals in applications requiring frequent starts, stops, reversals and widely fluctuating loads. *General Electric Co.*

Temperature Indicator 2

A four page form describes the BH183 "Autotemp," an exhaust gas or turbine inlet temperature servo-driven digital indicator which is completely self-contained. *B & H Instrument Co., Inc.*

Tube Flaring Machine 3

Bulletin 581 illustrates the Model C-2 tube flaring machine and the Model 2 Automation units. *Automation Associates, Inc.*

Storage Racks 4

Paltier Series 3200 storage racks which can be used as live-feeder racks, drive-in racks or as order-picking frames are described in Catalog 58B. *The Paltier Corp.*

Rigid Urethane Foam 5

Urethane Foam for use in radomes and guided missiles and numerous structural parts is featured in a six page booklet. Methods of pouring the rigid polyester based foam are included. *Allied Chemical Corp., National Aniline Div.*

Conductor Systems 6

Aluminum inverted-Y conductor systems including crane and runway electrification for general industrial usage requiring currents of 500 to 1200 amps are the subject of Booklet No. 1. *The Cleveland Crane & Engineering Co.*

Relay Tester 7

The Vari-Pac Relay tester which is engineered to check the accuracy and response of devices used to protect electrical equipment is described in a technical data bulletin prepared by *Sel-Rex Corp.*

(Please turn page)

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FREE LITERATURE — *Continued*

Data Sheet · 8

A four page data sheet which provides information on nuclear grade R and commercial grade C zirconium hydride (ZrH_2) is available from *Metal Hydrides, Inc.*

Process Instruments . 9

A 52 page catalog covers indicators, transmitters, recorders and controllers for flow, pressure, temperature, density, etc. *Fisher & Porter Co.*

Hydraulic Cutting Tools 10

A 70 page catalog describes a line of special purpose high thrust hydraulic cutting tools. It is divided into nine sections according to the types of material to be cut—wire and rod, steel billet, strip, bar, tubing, etc. *The Manco Mfg. Co.*

Industrial Products 11

A complete line of industrial products including general and specialty lubricants, greases, Diesel lubricating oils, cutting, quenching and other metal working oils is described in a bulletin prepared by the *Sun Oil Co.*

Square Design Cylinders 12

A catalog sheet containing drawings comparing the mounting space required for various bore square type 4-tie-rod design cylinders with similar bore sizes of the common threaded or keeper type cylinders is available from *Miller Fluid Power Div., Flick-Reedy Corp.*

Dip, Rinse Tanks 13

Bulletin 400 provides information on four standard models of all-steel dip and rinse tanks for precision finishing processes. Two water and two oil tanks are pictured in the bulletin. *Techline Div. of Wheelabrator Corp.*

Heat Treat Furnace 14

"Heat Treat Review" Volume 9, No. 2, features a "walking beam" furnace used in the heat treatment of space and aircraft forgings. A schematic diagram explaining the "beam" principle used in "walking" 375 lb jet wheel engine forgings through the furnace at temperatures of 1950 F is included. *Surface Combustion Corp.*

Fasteners 15

A four page bulletin illustrates the broad types of precision-engineered fasteners available with special features, and contains numerous illustrations of cold-forged fasteners produced for the automotive and aircraft industries by *Chandler Products Corp.*

Die Steel 16

Sagamore-EZ free machining air hardening die steel is described in a four page blue sheet available from Allegheny Ludlum Steel Corp. The sheet describes the steel as applicable to blanking and forming punches, dies and rolls; trimmer dies, cold or hot; plastic molding dies; straightening and bending dies; and gages.

Relief Valves 17

An engineering data sheet providing detailed specifications and dimensions on cartridge type pilot-operated relief valves has been announced by *Fluid Controls, Inc.*

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Ovens and Furnaces 18

Various heating, treating, processing, production and laboratory furnaces and two series of forced convection ovens for laboratory and production use are featured in an information sheet prepared by the *L&L Mfg. Co.*

Gas Welding Equipment 19

Catalog No. 586 illustrates a line of welding torches and tips, cutting torches and tips, regulators, and welding and cutting accessories. *Harris Calorific Co.*

Metal Disintegrator 20

The Cammann Model C-86 metal disintegrator which does arc drilling of all shaped holes in hardened steels, titanium, borium, stainless steel, stellite and other metals is described in detail in a bulletin prepared by *The Cammann Mfg. Co., Inc.*

Plate Bending Rolls 21

Bulletin 77E illustrates 9 and 10 in. diameter plate bending rolls with finger-tip control. A brake is featured to stop the rolls instantly, prevent drifting and to provide close control for inching. *Niagara Machine & Tool Works.*

Coatings 22

A 36 page brochure provides information on clear and colored coatings for use on metal, plastics, glass and wood. *Bee Chemical Co.*

Alloy Steels 23

Bulletin 415-C entitled "Quick Facts About Alloy Steels," presents information about the characteristics, elements, size and treatment of alloy steels. *Bethlehem Steel Co.*

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Steel Sheets, Strip 24

Bulletin 20-1 lists types of steel sheet and strip available in the form of coils, stock sizes and cut to order sizes produced by *Joseph T. Ryerson & Son, Inc.*

Instruments Catalog 25

Photographs and descriptions of tools, gages and inspection devices required in electronics, nucleonics, missiles, rockets and automation are included in a 12 page catalog offered by *Engis Equipment Co.*

Aluminum Nameplates 26

Bulletin 177, four pages describes four self-bonding methods of applying 0.003 in. anodized aluminum nameplates for product identification. *W. H. Brady Co.*

Air Clamp Cylinder 27

A clamp type universal, clevis or pivot mount air cylinder used for tooling, jigs and automation is described in a four page bulletin published by the *Sheffer Corp.*

Air Compressors 28

Bulletin A-95, eight pages, covering a complete line of heavy duty, low pressure compressors is available from *Joy Mfg. Co.*

Bolt Fastener 29

A four-page brochure covers the Tau Bolt fastener and lists specifications for both protruding head and counter-sunk head designs. *Huck Manufacturing Co.*

Nylon Bearings

Form 209, seven pages, illustrates the use of snap-in or flanged-type Nylined Bearings and how they eliminate press fitting operations or the need for separate retaining devices. Nylined Bearings can be installed or removed without the use of tools. *Address request on company letterhead to Thomson Industries, Inc., Manhasset, New York.*

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THE "CONTROLLED EXPANSION" PISTON

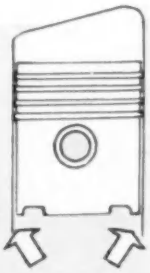
Engineered for COOLER RUNNING

20% Greater Heat Conductivity

GREATER DURABILITY

No Compromise with Strength in Design

Superiority is outstanding in the Zollner "Clear-O-Matic" Piston. The expertly engineered design of this great piston development incorporates vitally desired performance advantages in addition to the basic Zollner designed expansion control feature. Clear-O-Matic is a remarkably cool piston with greater area of conductivity for heat dissipation. This greater section provides uncompromised strength for long-life durability. No other piston provides Clear-O-Matic advantages. We suggest an immediate test for your engine.



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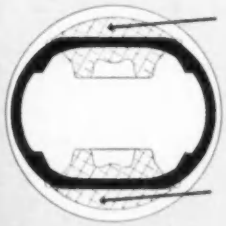
Anchored only at pin bosses and cast in positive contact with I.D. of piston skirt.

Automatically maintains uniform effective skirt clearance at all temperatures.



COOL PISTONS

20% greater section for heat conductivity.

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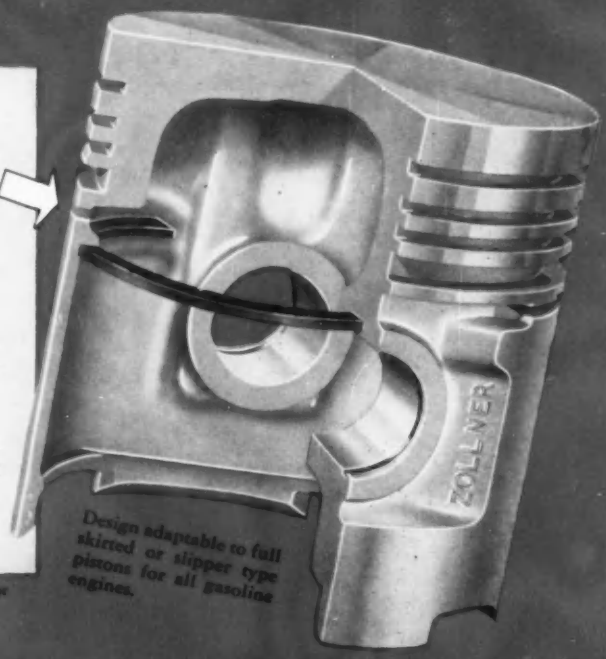

Design adaptable to full skirted or slipper type pistons for all gasoline engines.

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For tricky shapes like these...

Steel that's hard and tough but easy to machine

PARTS like slitter knives, collets, split bearing races and the others shown above have to be hard and tough. But because of their intricate shapes, they have to be made of a steel that's easy to machine. This combination of toughness and machinability isn't easy to find. But you get it in Timken® 52100 steel.

Timken 52100 steel has a fully spheroidized structure that makes machining easy—without sacrificing strength or hardenability. It is a high-carbon analysis alloy steel with high fatigue and tensile strength and good hardenability throughout its cross section. Timken 52100 steel withstands working pressures up to 200,000 p.s.i., can be oil quenched to a maximum hardness of 65/66 Rockwell C in normal sections. And you can be sure of uniform quality in every shipment of Timken 52100 steel, because the Timken Company controls quality through every production step, from furnace to final inspection.

The Timken Company pioneered the production of 52100 steel tubing in the U. S. We're one of the world's largest producers of this hard, tough steel and the *only* source of 52100 steel in three finished forms—bars, tubing and wire. For small run or emergency requirements, we maintain a mill stock of 52100 tubing, in 101 sizes ranging from 1″ to 10½″ O.D. Write for a complete stock list of available sizes, grades and finishes. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable: "TIMROSCO".

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